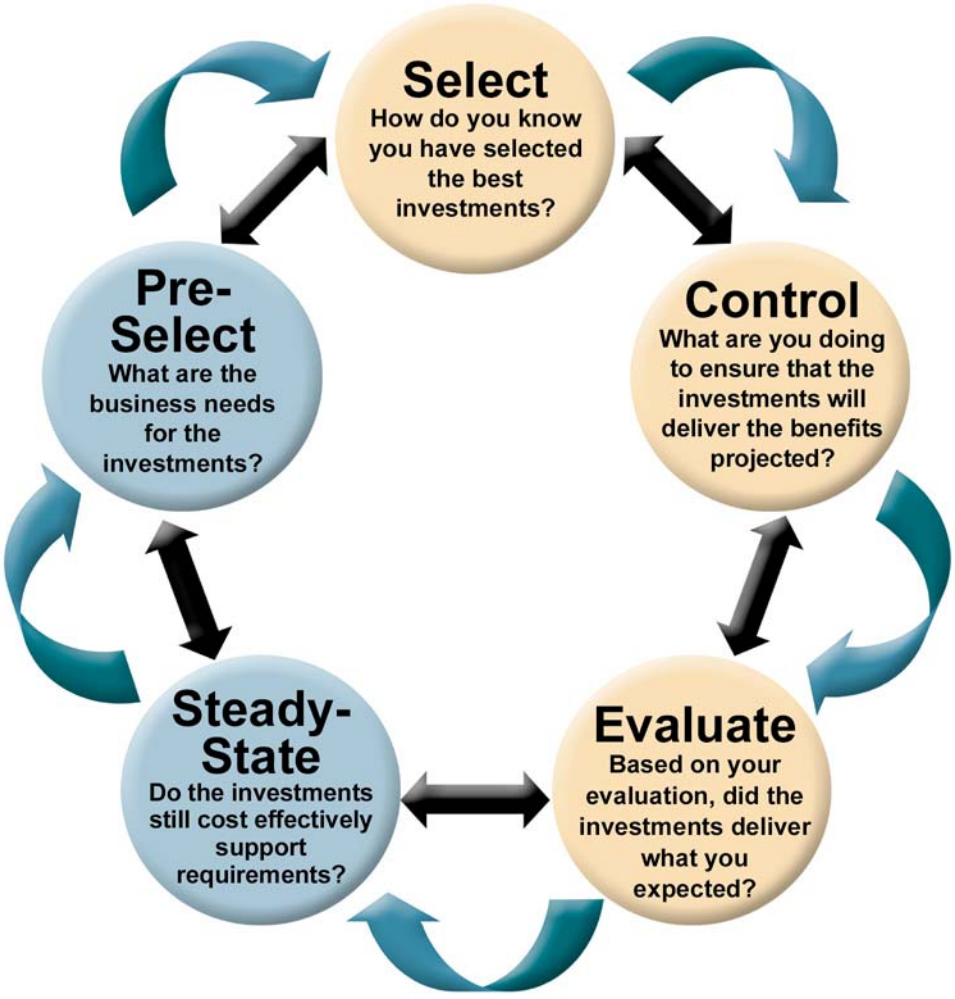
USDA UNITED STATES DEPARTMENT OF AGRICULTURE

INFORMATION TECHNOLOGY CAPITAL PLANNING AND INVESTMENT CONTROL GUIDE



MAY 2001

OFFICE OF THE CHIEF INFORMATION OFFICER

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

TABLE OF CONTENTS

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

EXECUTIVE SUMMARY

INFORMATION TECHNOLOGY CAPITAL PLANNING AND INVESTMENT CONTROL GUIDE

In 2002, the United States Department of Agriculture (USDA) will invest over $1.3 billion in information technology (IT) assets and services. The success of these IT investments directly influences the ability of component agencies within USDA to execute business plans and fulfill missions. For example:

- The Food and Nutrition Service is heavily dependent upon Electronic Benefit Transfer (EBT) to carry out its $15 billion Food Stamp Program. About 75 percent of food stamp benefits are currently being issued via EBT.
- The Rural Development mission area is highly dependent upon its information systems to manage its $60 billion loan portfolio.

The Key Components

Recognizing both the importance of IT investments to the organization and its role in supporting the success of these investments, the Office of the Chief Information Officer (OCIO) is engaged in an ongoing effort to establish, maintain, and support an IT investment analysis and decision-making environment. This environment consists of three key components: executive decision-makers, supporting tools, and repeatable processes. Each is described below:

- **Executive decision-makers**—Consists primarily of the Executive Information Technology Investment Review Board (EITIRB) and executive working groups appointed by the EITIRB. These bodies oversee the process and are stakeholders in the success of USDA.
- **Tools**—USDA uses a variety of tools to manage its IT investments. However, the primary tool is the Information Technology Investment Portfolio System (I-TIPS). I-TIPS is a government-standard, Web-based computer system for recording and monitoring IT investments.1 The OCIO maintains and supports I-TIPS.
- **Processes**—Capital Planning and Investment Control (CPIC) is USDA's primary process for (1) making decisions about which initiatives and systems USDA should invest in and (2) creating and analyzing the associated rationale for these investments.2 As summarized below, this guide describes the CPIC process in detail.

This Guide

The *USDA Information Technology Capital Planning and Investment Control Guide* identifies the processes and activities necessary to ensure that USDA's investments in IT are well thought out, cost-effective, and support the missions and business goals of the organization. It is based on guidance from both the Office of Management and Budget (OMB) and the Government Accounting Office (GAO). It also incorporates "lessons learned" from USDA's iterations through the process over the last two years.

At the highest level, the CPIC process is a circular flow of USDA's IT investments through five sequential phases. As shown in **Figure ES-1**, these phases are:

- **Pre-Select Phase**—Executive decision-makers assess each proposed investment's support of USDA's strategic and mission needs. Project Managers compile the information necessary for supporting a detailed proposal assessment.
- **Select Phase**—Investment analyses are conducted and the EITIRB chooses the IT projects that best support the mission of the organization, comply with USDA's IT architecture, and are prepared for success.
- **Control Phase**—USDA ensures, through timely oversight, quality control, and executive review, that IT initiatives are executed or developed in a disciplined, well-managed, and consistent manner.
- **Evaluate Phase**—Actual results of the implemented projects are compared to expectations to assess investment performance. This is done to assess the project's impact on mission performance, identify any project changes or

1 The specific manner is which I-TIPS is to be used in conjunction with the CPIC is identified within this guide.

2 As currently defined, this process affects major information systems that collectively comprise more than 65 percent of the Department's annual IT budget (or about $900 million).

modifications that may be needed, and revise the investment management process based on lessons learned.

- **Steady-State Phase**—Mature systems are assessed to ascertain their continued effectiveness in supporting mission requirements, evaluate the cost of continued maintenance support, assess potential technology opportunities, and consider retirement or replacement options.

Each of these five phases is structured in a similar manner using a set of common elements. These common elements provide a consistent and predictable flow and coordination of activities within each phase.

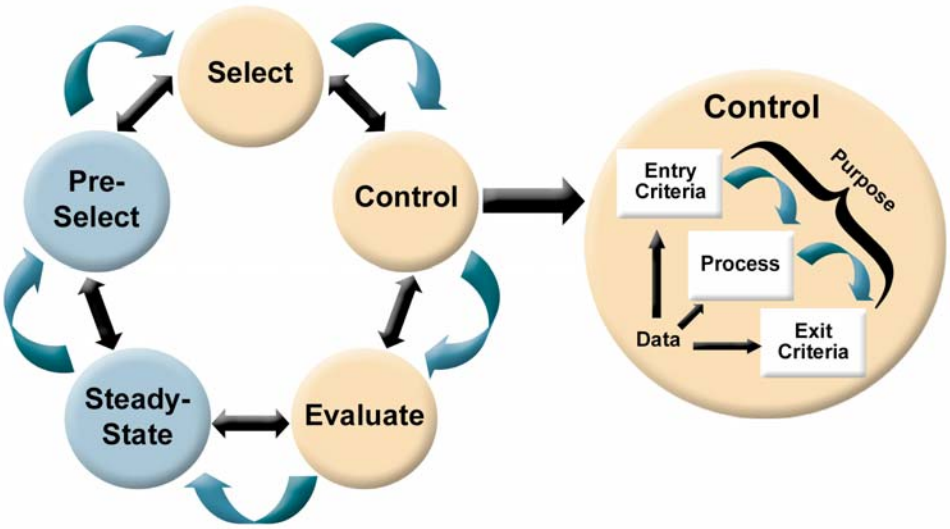


Figure ES-1. The Five CPIC Phases and the Common Elements Within Each Phase

Beyond the detailed CPIC process and activity description, this Guide also includes:

- A charter for the EITIRB and the associated operating procedures necessary to conduct investment reviews
- A template for evaluating the mission need of a new IT investment proposal
- Guidance on how to:
  - ▲ Complete a Cost-Benefit Analysis (CBA)
  - ▲ Conduct a risk assessment for IT capital planning
  - ▲ Develop performance measures for IT projects
  - ▲ Manage IT projects
  - ▲ Conduct earned value analysis
  - ▲ Conduct a Post-Implementation Review (PIR)
- The scoring criteria to be used by the executive working groups and EITIRB during investment reviews
- A glossary of terms and acronyms used throughout this document
- A list of references used to create this document.

For further information on IT investment management or USDA's CPIC process, please contact Dan Stoltz in the OCIO at either (202) 720-9080 or at Dan.Stoltz@usda.gov.

CHAPTER 1—INTRODUCTION

1.1 PURPOSE

This document describes the United States Department of Agriculture (USDA) Information Technology (IT) Capital Planning and Investment Control (CPIC) process. As such, it outlines a framework for USDA to manage its IT investment portfolio better. This investment management process allows USDA to optimize the benefits of scarce IT resources, address the strategic needs of USDA, and comply with applicable laws and guidance.

Major investments, while small in number, constitute about half of USDA's IT investment costs each year and can have significant impacts on the efficient and effective operation of USDA agencies and services. **Figure 1-1** shows the size of the major systems budget relative to the entire IT budget for fiscal year (FY) 2001.

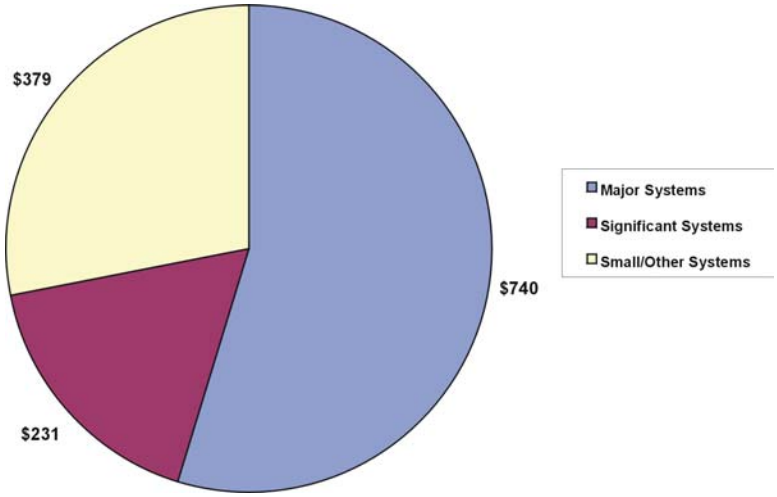


Figure 1-1. USDA FY 2001 IT Investments Budget (in Millions of Dollars as of March 15, 2001)

The CPIC is a structured, integrated approach to managing IT investments. It ensures that all IT investments align with the USDA mission and support business needs while minimizing risks and maximizing returns throughout the investment's lifecycle. The CPIC relies on a systematic preselection, selection, control, and on-going evaluation process to ensure each investment's objectives support the business and mission needs of the Department (see **Figure 1-2**).

Through sound management of these investments, the Executive Information Technology Investment Review Board (EITIRB) determines the IT direction for USDA, and ensures that agencies manage IT investments with the objective of maximizing return to the Department and achieving business goals.

1.2 LEGISLATIVE BACKGROUND AND ASSOCIATED GUIDANCE

Five recent statutes require Federal agencies to revise their operational and management practices to achieve greater mission efficiency and effectiveness. These laws include:

- The Chief Financial Officer (CFO) Act of 1990
- The Government Performance and Results Act of 1993 (GPRA)
- The Federal Acquisition Streamlining Act of 1994 (FASA)
- The Paperwork Reduction Act of 1995 (PRA)
- The Clinger-Cohen Act of 1996 (CCA).

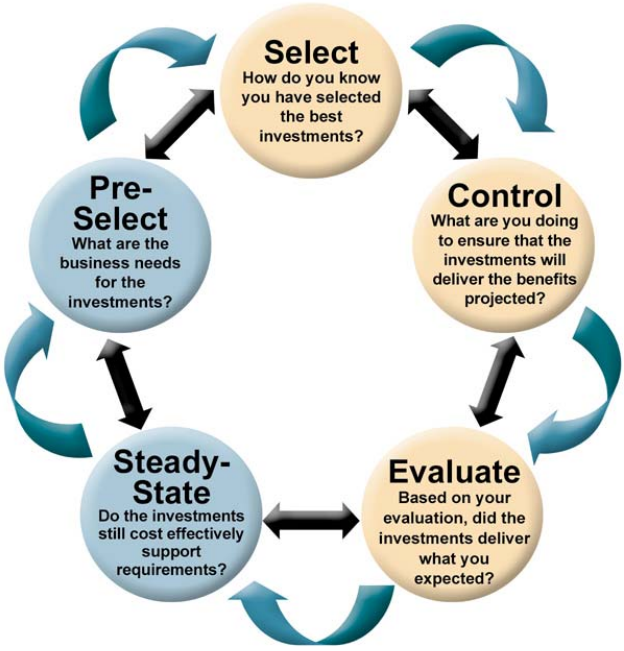


Figure 1-2. CPIC Information and Process Flow

This CPIC Guide is based upon the IT aspects of these laws, and focuses specifically on the CCA requirements. The CCA's objective is that senior managers use a CPIC process to systemically maximize the benefits of IT investments. The Act further describes CPIC as follows:

- "The Head of each executive agency shall design and implement in the executive agency a process for maximizing the value and assessing and managing the risk of the information technology acquisitions of the executive agency" and
- "The process shall:
  1. Provide for the selection of information technology investments to be made by the executive agency, the management of such investments, and the evaluation of the results of such investments;
  2. Be integrated with the processes for making budget, financial, and program management decisions within the executive agency;
  3. Include minimum criteria to be applied in considering whether to undertake a particular investment in information systems, criteria related to the quantitatively expressed projected net risk-adjusted return on investment and specific quantitative and qualitative criteria for comparing and prioritizing alternative information systems investment projects;
  4. Provide for identifying information systems investments that would result in shared benefits or costs for other Federal agencies of State or local governments;
  5. Require identification of quantifiable measurements for determining the net benefits and risks of a proposal investment; and
  6. Provide the means for senior management to obtain timely information regarding the progress of an investment, including a system of milestones for measuring progress, on an independently verifiable basis, in terms of cost, capability of the system to meet specified requirements, timeliness, and quality."

Beyond the legislative background, there is extensive guidance from the Federal Chief Information Officer (CIO) Council, the Office of Management and Budget (OMB), the General Accounting Office (GAO), and others in the area of IT investment management. A list of investment management reference guides and memos is identified in **Appendix O**. The policy and processes described in this Guide are consistent with this guidance.

1.3 Points of Contact

The CPIC process is primarily supported and maintained by the USDA Office of the Chief Information Officer (OCIO). For further information about this Guide or the CPIC process, please contact Dan Stoltz in the OCIO at either (202) 720-9080 or at Dan.Stoltz@usda.gov.

1.4 Scope

All IT projects within USDA must comply with this CPIC guidance. Exemptions to this guidance are granted only in exceptional circumstances. However, not all IT projects must be reviewed by the EITIRB. Only those IT projects that are considered to be "major" and strategic investments for the Department are required to be included in the EITIRB executive portfolio. It is expected that each individual USDA agency will have a similar CPIC process, manage its own portfolio, and create associated thresholds. At a minimum, each agency is expected to use the CPIC process to manage its "significant" investments.

The thresholds for a project to be considered "major" are described in the following section.

1.5 Thresholds for Major IT Investments

Major IT systems meet at least one of the following criteria:

- Total lifecycle costs greater than $50 million
- Significant multiple-agency impact
- Mandated by legislation or executive order, or identified by the Secretary as critical
- Require a common infrastructure investment
- Department strategic or mandatory-use system
- Significantly differs from or impacts on the Department infrastructure, architecture, or standards guidelines.

These investments are considered to be strategic for the Department and, thus, have a greater documentation burden, including being individually reported to OMB on an Exhibit 300B. They are also included in the EITIRB executive portfolio.

1.6 Roles and Responsibilities

The following decision-making bodies and personnel have been assigned the responsibilities listed below.

- **Key Decision-Making Bodies**—The governing and approval bodies responsible for ensuring that proposed investments meet USDA strategic, business, and technical objectives.
  - **EITIRB**— Responsible for reviewing and approving strategic investments at USDA. It is staffed by the sub cabinet members and is chaired by the Deputy Secretary and vice-chaired by the CIO. (See **Appendix A—Board Procedures** for the EITIRB Charter).
  - **Executive Working Group(s) (EWG)**—Responsible for assessing how well potential major investments meet a predetermined set of capital planning decision criteria and providing recommendations to the EITIRB. The EITIRB appoints Executive Working Groups as needed.
  - **OCIO**—Responsible for setting IT policy, reviewing investments, and making recommendations.
- **Key Agency Personnel**—The agency personnel responsible for investment management and successful completion of the CPIC:
  - *Agency Head*—Responsible for signing CPIC documentation before submission to OCIO.
  - *Agency Sponsor*—Responsible for providing executive sponsorship of the investment; should be a senior level executive within the applicable mission area or agency.
  - *Project Sponsor/Functional Manager*—Responsible for the strategic business processes under development or enhancement and for ensuring their integrity; also serves as the primary user interface to the OCIO, EWG, and EITIRB.
  - *Project Manager*—Responsible for successful management and completion of one or more IT investments.
  - *IT Manager*—Responsible for serving as the primary point of contact for technology issues.

- *Contracting Specialist*—Responsible for serving as the primary acquisition support for the investment and interface between the investment and the Office of Procurement and Property Management (OPPM).
- *Capital Planning Analyst*—Responsible for serving as the primary interface for capital planning between the investment and OCIO.
- *Budget Analyst*—Responsible for serving as the primary interface between the investment and the Office of Budget and Program Analysis (OBPA).

1.7 Process Overview

The CPIC is a fluid, dynamic process in which proposed and ongoing projects are continually monitored throughout their lifecycle. Successful investments and those that are terminated or delayed are evaluated both to assess the impact on future proposals and to benefit from any lessons learned. The CPIC contains five phases (Pre-Select, Select, Control, Evaluate, and Steady-State). As detailed in this document, each phase contains the following common elements:

- **Purpose**—Describes the objective of the phase;
- **Entry Criteria**—Describes the phase requirements, and thresholds for entering the phase;
- **Process**—Describes the type of justification, planning, and review that will occur in the phase; and
- **Exit Criteria**—Describes the actions necessary for proceeding to the next phase.

Completing one phase is necessary before beginning a subsequent phase. Each phase is overseen by the EITIRB, which ultimately approves or rejects an investment's advancement to the next phase. This ensures that each investment receives the appropriate level of managerial review and that coordination and accountability exist. Exceptions to CPIC requirements must be identified in the IT investment's project plan.

USDA agencies and staff offices that have new IT investment proposals meeting the "major" IT investment criteria should prepare an investment proposal according to the guidelines provided in this document. The proposal's length and level of detail should be commensurate with the system's size or impact. These proposals will enter the CPIC process. They will be analyzed by OCIO for quality and conformance to policies and guidelines and reviewed against the applicable strategic investment criteria. OCIO prepares an investment analysis and forwards it, along with the agency investment proposal to an EWG. The EWG review the proposals and OCIO analysis and scores the investment initiative. A recommendation is then prepared and forwarded to the EITIRB for approval/disapproval action. Approval, if granted, is an approval of concept, indicating that the agency or staff office has done the preparatory work necessary to fully justify the investment, and has the mechanisms in place to manage the investment through acquisition, development and implementation, and operation. The investment must still compete for funding through the agency budget process.

1.8 Process Coordination

Investments that have been approved must move through processes to obtain investment funding. The agency is responsible for preparation of budget and/or Working Capital Fund requests for its investment submissions. The agency is also responsible for preparation and submission of IT acquisition moratorium waiver requests when acquisitions for a given investment exceed the current moratorium threshold.

1.9 Document Structure

This document is divided into six chapters and 15 appendices as described below:

- **Chapter 1—Introduction.** Describes the CPIC purpose, scope, thresholds, roles, process, and document structure.
- **Chapter 2—Pre-Select Phase.** Provides a process and mechanism to assess an investment's support of agency strategic and mission needs.
- **Chapter 3—Select Phase.** Provides tools to ensure that IT investments are chosen that best support the agency's mission and that comply with USDA's IT architecture.
- **Chapter 4—Control Phase.** Provides guidance to ensure that IT initiatives are conducted in a disciplined, well-managed, and consistent manner, which promote the delivery of quality products and result in initiatives that

are completed within scope, on time, and within budget.

- **Chapter 5—Evaluate Phase.** Provides guidance on comparing actual to expected results once a project has been fully implemented.
- **Chapter 6—Steady-State Phase.** Provides a means to assess mature systems to ascertain their continued effectiveness in supporting mission requirements and to evaluate the cost of continued support or potential retirement and replacement.
- Appendices:
  - *Board Procedures*—Provides the EITIRB charter that includes its roles and responsibilities.
  - *CPIC Process Checklist*—Provides a checklist of the process steps investments must complete for each CPIC phase.
  - *Mission Needs Statement*—Provides a template for evaluating the mission need(s) for a new IT investment.
  - *Steady-State Investment Review Template*—Provides a template for evaluating investments in the Steady-State Phase.
  - *Cost-Benefit Analysis*—Provides guidance on completing a Cost-Benefit Analysis (CBA).
  - *Risk Assessment*—Provides guidance on conducting a risk assessment for IT capital planning.
  - *Performance Measurement*—Provides guidance on developing performance measures for IT investments.
  - *Project Management*—Provides guidance on managing IT investments.
  - *Earned Value Analysis*—Provides guidance on conducting earned value analysis.
  - *Post-Implementation Reviews*—Provides guidance on conducting a Post-Implementation Review (PIR).
  - *Strategic Investment Criteria and Bonus Point Evaluation Tools*—Provides the scoring criteria used by an EWG and the EITIRB during the annual investment review.
  - *I-TIPS Requirements by Phase*—Provides a summary of the data required in the Information Technology Investment Portfolio System (I-TIPS) for each CPIC phase.
  - *Quarterly/Milestone Control Review Checklist*—Lists the critical areas the Control Review Team discusses during each Quarterly/Milestone Review.
  - *Glossary of Terms and Acronyms*—Provides definitions for terms and acronyms used throughout this document.
  - *References*—Provides a list of references used to develop this document.

CHAPTER 2—PRE-SELECT PHASE

2.1 PURPOSE

The Pre-Select Phase provides a process to assess a current investment's support of agency strategic and mission needs and to provide initial information to further support investments. It is during this phase that the business/mission need is identified and relationships to the Department and/or agency strategic planning efforts are established. There are significant information requirements and a potential expenditure of funds in the preliminary planning phase to prepare for review and selection of IT investments. The Pre-Select Phase provides an opportunity to focus efforts and further the development of the initiative's concept. It also provides a more complete identification of performance measures, benefits, and costs, as well as subsequent completion of a business case and project planning efforts in preparation for inclusion in the Department's investment portfolio.

2.2 ENTRY CRITERIA

Prior to entering the Pre-Select Phase, investments must have a concept to address the mission need that is anticipated to include an IT component and meet at least one of the threshold criteria identified in section "1.5 Thresholds for Major IT Investments."

2.3 PROCESS

During the Pre-Select Phase, mission analysis results in the identification of a mission need necessitating consideration of an IT alternative. The mission analysis and corresponding development of the Mission Needs Statement (see **Appendix C—Mission Needs Statement**) are closely linked to the strategic planning process of the USDA and sponsoring agency. Following mission analysis, the Functional Manager further develops the proposed solution's concept. Objectives are established, evaluation criteria are defined, concept alternatives are identified, and an alternative analysis approach is documented as part of the concept management plan to support concept and mission need approval. A preliminary business case with budget estimates and associated CBA is also completed.

Table 2-1 provides a summary of the Pre-Select Phase process, as well as the individual(s) and/or group(s) responsible for completing each process step. Each step is detailed following the table.

Process Step	Responsible Individual(s) or Group(s)
1. Identify Project Sponsor.	❖ Agency Head
2. Conduct mission analysis.	❖ Functional Manager
3. Develop concept.	❖ Functional Manager
4. Prepare preliminary business case.	❖ Functional Manager
5. Prepare investment review submission package.	❖ Project Manager ❖ Functional Manager ❖ Agency Sponsor
6. Review/approve investment submission.	❖ Agency Head
7. Review initiative and recommend appropriate action.	❖ OCIO ❖ EWG
8. Make final investment decisions.	❖ EITIRB

Table 2-1. Pre-Select Phase Process Flow

1. Identify Project Sponsor

The Agency Head identifies a Project Sponsor for each accepted proposal. The Project Sponsor will normally be the same person as the Functional Manager but if the investment is crosscutting, strategic, or high visibility, the Project Sponsor may be different from the Functional Manager. The Project Sponsor should be a senior individual in the organization with requisite management, technical, and business skills to lead the investment or supervise a designated Project Manager.

The Project Sponsor is the business leader responsible to the EITIRB for the investment as it continues through the CPIC process. Commercial

and government best practices show that IT investments championed by a business leader have the best chance for successful deployment. This commitment by the Project Sponsor to the EITIRB represents accountability for the investment.

2. Conduct Mission Analysis

Mission analysis is a strong, forward-looking, and continuous analytical activity that evaluates the capacity of the Department's and/or agency's assets to satisfy existing and emerging demands for services. Mission analysis enables the Department and/or agency to determine and prioritize the most critical capability shortfalls and best technology opportunities for improving the USDA's overall security, capacity, efficiency, and effectiveness in providing services to customers.

Mission analysis is conducted within the framework of USDA's architecture and long-range strategic goals. In turn, mission analysis contributes strongly to the evolution of strategic planning and USDA IT architecture development. (See **Appendix C—Mission Needs Statement** for a template on how to conduct mission analysis).

Consequently, mission analysis yields the identification of critical needs the Department should address. It estimates the resources the agency and/or Department will likely be able to commit to each mission need, in competition with other needs, within the constraint of a realistic projection of future agency budget authority. The resource estimate becomes a "placeholder" until the mission need is approved. More accurate resources quantification is conducted during the investment analysis if the investment is selected as part of the Department's portfolio. The resource estimate is a function of the benefit to the agency and the mission area, the cost of not addressing the need (e.g., poor customer responsiveness, increased maintenance cost, lost productivity, etc.), and the likely extent of required changes to the agency's infrastructure.

If the mission analysis reveals a non-IT solution (e.g., a rulemaking/policy change, operational procedural change, or transfer of systems between sites) that can satisfy a capability shortfall and can be achieved within approved budgets, it can be implemented without proceeding further in the CPIC process.

All Mission Needs Statements will emerge from a structured mission analysis. However, any individual or organization may propose a mission need based on a perceived capability shortfall or technological opportunity. Examples of potentially valid needs that could originate outside USDA lines of business include those related to socioeconomic and demographic trends, the environment, statutory requirements, or an industry-developed technological opportunity. These shortfalls and opportunities should be identified to the appropriate Functional Manager who will determine how mission analysis should be conducted to validate, quantify, and prioritize the proposed need.

USDA lines of business conduct mission analysis within their areas of responsibility. The principal activities of mission analysis are:

- Identify and quantify projected demand for services based on input from diverse sources such as the agriculture/rural community; architecture and strategic planners for services needed in the future; and integrated project teams (IPTs) in the form of performance and supportability trends of fielded systems. Identify and quantify projected technological opportunities that will enable the USDA to perform its mission more efficiently and effectively.
- Identify and quantify existing and projected services based on information from field organizations, the USDA architecture, and IT asset inventory that defines what is in place and what is approved for implementation.
- Identify, analyze, and quantify capability shortfalls (i.e., the difference between demand and supply) and technological opportunities to increase quality of service, efficiency, and effectiveness.
- Identify the user and customer base affected.
- Prepare a Mission Needs Statement that summarizes the mission analysis for inclusion with the Pre-Select CPIC packet submission.

When mission analysis identifies a capability shortfall or technological opportunity, the results are summarized in a Mission Needs Statement. The Mission Needs Statement must clearly describe the capability shortfall and the impact of not satisfying the shortfall, or the technological opportunity and the increase in efficiency it will achieve. The Mission Needs Statement also must assess the criticality and timeframe of the need, and

roughly estimate the resources the agency should commit to resolving it based on worth, criticality, and the scope of likely changes to the agency's IT asset base. This information forms the basis for establishing the priority of this need in competition with all other agency and/or Department needs.

3. Develop Concept

Concept development provides the opportunity for further examination of a proposed solution. It focuses on an analysis of alternatives to meet the mission need and initial planning for entering into the Select Phase. Key components include analysis of alternatives and an examination and redesign of business practices.

The following activities are conducted during concept development:

- Assess Mission Needs Statement.
- Identify business objectives based on mission analysis and Mission Needs Statement.
- Discuss the proposed investment in relation to OMB's "Pesky Questions":
  - ▲ Does the investment in major capital asset support core/priority mission functions that need to be performed by the Federal Government?
  - ▲ Does it have to be undertaken by the requesting agency because no alternative private sector or government source can more efficiently support the function?
  - ▲ Does the investment support work processes that have been simplified or otherwise redesigned to reduce costs, improve effectiveness, and make maximum use of commercial-off-the-shelf (COTS) technology?
- Identify high-level performance measures. (Additional detailed performance measures will be developed as part of the Select Phase.)
- Determine key selection criteria to evaluate concept alternatives that support high-level performance measures and business objectives.
- Identify alternatives that will be analyzed to support mission need and business objectives.
- Conduct preliminary planning and develop a Concept Management Plan addressing Select Phase preparation, alternative analysis approach, and business redesign/reengineering. (Raines' Rules requires that before new systems are fielded the business process owners must simplify or otherwise redesign their existing processes before they invest in new IT to support the process.) Plans for redesign or Business Process Reengineering (BPR) should be presented as part of the Pre-Select submission.

4. Develop Preliminary Business Case

The business case provides the necessary information to build support and make funding decisions for an investment. While the primary emphasis of the Pre-Select Phase is on mission and strategic needs analysis, it also requires the Functional Manager to begin identifying alternative solutions and developing an order of magnitude estimate of costs and benefits (both quantitative and qualitative) that may be realized by a given investment. Initial business case development activities include a preliminary budget estimate and preliminary CBA, as discussed below.

- **Prepare preliminary budget estimate**—The preliminary budget estimate should provide an estimate of costs necessary to support more detailed planning and concept development prior to investment selection, and provide an order of magnitude estimate of budget requirements to support a five-year budget plan.

  As part of the preliminary budget estimate, a preliminary Security and Telecommunications Infrastructure Analysis should be performed to determine estimated baseline costs for these two cost elements. This information should be included with the investment's preliminary budget estimate. Detailed information concerning the preparation of a security and telecommunications infrastructure analysis can be found on these web sites: www.ocio.usda.gov/irm/cap_plan/security_plan/index.html and www.ocio.usda.gov/irm/cap_plan/tele_plan/index.html.
- **Prepare Preliminary CBA**—The preliminary CBA will provide initially anticipated costs and benefits of the proposed investment. Costs should be the same as those identified in the budget estimate and benefits should be aligned with the investment objectives and high-level performance measures.

5. Prepare Investment Review Submission Package

The Project Manager, Functional Manager, and Agency Sponsor prepare the Pre-Select submission package in preparation for USDA's annual investment review. The package of materials for proposed major IT investments in the Pre-Select Phase should address the following areas in this order:

- Introduction and brief overview of mission need
- Mission Needs Statement
- OMB's "Pesky Questions" Analysis
- Concept Management Plan
- Preliminary CBA and budget estimate.

6. Review/Approve Investment Submission

The Agency Head reviews the investment submission and requests the Functional Manager and/or Agency Sponsor to update the package or make changes as needed. The Agency Head then approves the investment submission and forwards it to the OCIO.

7. Review Initiative and Recommend Appropriate Action

The OCIO reviews the package and provides any comments and/or questions to the agency. The agency addresses the issues and sends an updated package to the OCIO. The OCIO forwards the updated package with its assessment to an EWG for review. The EWG assesses the investment with an emphasis on mission alignment and the proposed concept management plan. This information is then linked to future portfolio selection decisions. The EWG lastly forwards their investment recommendations to the EITIRB for the final decision.

8. Make Final Investment Decisions

The EITIRB reviews the EWG's recommendation and makes the final investment decisions. If the EITIRB approves the EWG's recommendation, the Agency Sponsor moves forward with alternative analysis, detailed CBA, and risk assessment, and begins to prepare for the investment's portfolio selection.

2.4 EXIT CRITERIA

Prior to exiting the Pre-Select Phase, investments must obtain EITIRB approval for the mission need and concept.

CHAPTER 3—SELECT PHASE

3.1 PURPOSE

In the Select Phase, USDA ensures the IT investments that best support the mission and comply with USDA's IT architecture are chosen and prepared for success (i.e., have a good project manager, are analyzing risks, etc.). Individual investments are evaluated in terms of technical alignment with other IT systems and projected performance as measured by Cost, Schedule, Benefit, and Risk (CSBR). Milestones and review schedules are also established for each investment during the Select Phase.

In this phase, USDA prioritizes each investment and decides which investments will be included in the portfolio. Investment submissions are assessed against a uniform set of evaluation criteria and thresholds. The investment's CSBR are then systematically scored using objective criteria and the investment is ranked and compared to other investments. Finally, the EITIRB selects which investments will be included in the Department's portfolio.

3.2 ENTRY CRITERIA

Prior to entering the Select Phase, investments must have obtained EITIRB approval for the mission need and concept.

3.3 PROCESS

The Select Phase begins with an investment concept (approved during the Pre-Select Phase) and moves through the development of the business case, acquisition plan, risk analysis, performance measures, and a project plan. These plans lay a foundation for success in subsequent phases. The Select Phase culminates in a decision whether to proceed with the investment.

Table 3-1 provides a summary of the Select Phase process, as well as the individual(s) and/or group(s) responsible for completing each process step. Each step is detailed following the table.

Process Step	Responsible Individual(s) or Group(s)
1. Review the Mission Needs Statement and update if needed.	✦ Functional Manager
2. Approve Integrated Project Team membership.	✦ Agency Head
3. Identify funding source and obtain agency approvals.	✦ Project Sponsor
4. Develop major investment supporting materials.	✦ Project Sponsor
5. Prepare IT investment review submission.	✦ Project Sponsor
6. Review/approve investment submission.	✦ Agency Head
7. Review initiative and recommend appropriate action.	✦ OCIO ✦ EWG
8. Make final investment decisions.	✦ EITIRB

Table 3-1—Select Phase Process Flow

1. Review the Mission Needs Statement and Update if Needed

The Functional Manager reviews the Mission Needs Statement and other documentation completed during the Pre-Select Phase and makes any necessary changes. Next, the Functional Manager develops quantifiable performance measures that focus on outcomes where possible (see **Appendix G—Performance Measurement**). The Functional Manager also describes the qualitative improvements in measurable terms such as customer satisfaction. These performance measures will form a basis for judging investment success.

2. Approve Integrated Project Team membership

The Agency Head approves the selection of the IPT members that will assist the Project Sponsor and Project Manager in the initiative's develop-

ment. The IPT brings together expertise from functional areas as required by the specifics of the initiative. A Capital Planning Analyst from the OCIO Information Resource Management (IRM) office will work with and provide guidance to the IPT throughout the process.

Serving on the IPT will normally be an additional duty but initiative size or potential impact may increase commitment. The IPT should consist of functional experts in the following areas:

- Functional Manager with program experience
- IT Manager with experience in proposed technology
- Telecommunications specialist
- Cyber security specialist
- Agency Budget Analyst
- A Contracting Specialist.

Additional staff may be added from other functional areas as needed.

3. Identify Funding Source and Obtain Approvals

The Project Sponsor identifies a potential funding source for the EITIRB to continue investment support. The Project Sponsor then gets approval from the offices listed in **Table 3-2**, as needed, depending upon the investment's characteristics. The members of the IPT should assist in coordinating these actions within their respective functional areas.

Office	Characteristic that triggers office approval request
OCIO	Investment exceeds agency threshold.
Office of Chief Financial Officer (OCFO)	Investment involves an appropriation, accounting, or financial system.
OPPM	IT system more than $25 million or Office of Operations system more than $50 million.
Contracting Officer	Determining acquisition strategy, i.e., capability to use the Office of Small and Disadvantaged Business Utilization programs for procurement.
Office of General Counsel	Legal review of solicitation documents more than $500,000.
OBPA	Ensure investment is included in budget submission.

Table 3-2. Approval Requirements

4. Develop Major Investment Supporting Materials

The Project Sponsor ensures, that for each investment, the following studies are completed and the results are submitted to the OCIO:

- Business Profile:
  - Business Case with Performance Measures (see **Appendix G—Performance Measurement**)
  - Functional Requirements
  - Feasibility Study.
- Risk Profile:
  - Risk Assessment and Mitigation Plan (see **Appendix F—Risk Assessment**)
  - Initiative Pilot/Prototype Plans.
- Financial Profile:
  - Return on Investment (ROI) and CBA (see **Appendix E—Cost-Benefit Analysis**)
  - Alternatives Analysis
  - Funding Source Identification.
- Technological Profile:
  - Technical Requirements
  - Security Plan (see www.ocio.usda.gov/irm/cap_plan/security_plan/index.html for

instructions on preparing security plan documentation)

- ▲ Telecommunications Plan (see www.ocio.usda.gov/irm/cap_plan/tele_plan/index.html for instructions on preparing telecommunications plan documentation)
- ▲ Relationship to Existing Systems (Dependencies).

- Management and Planning Profile:
  - ▲ Project Plan, Including a List of Team Members
  - ▲ Acquisition Plan
  - ▲ Independent Verification and Validation (IV&V) Documentation (if warranted).

5. Prepare IT Investment Review Submission

The Project Sponsor also prepares the submission package in preparation for USDA's annual investment review. The package of materials for proposed major IT investments in the Select Phase should address the following areas in this order:

- Introduction and brief overview of the investment
- Mission Needs Statement
- Acquisition strategy
- Initial project plan with estimated costs listed for each work breakdown structure (WBS)
- CBA and budget estimate, including risk-adjusted ROI and net present value (NPV) calculations
- Risk
- Security (see www.ocio.usda.gov/irm/cap_plan/security_plan/index.html for instructions on preparing security plan documentation)
- Performance goals
- Architecture, including IT accessibility for persons with disabilities (Section 508)
- Telecommunications Plan (see www.ocio.usda.gov/irm/cap_plan/tele_plan/index.html for instructions on preparing telecommunications plan documentation)
- Secretarial priority.

6. Review/Approve Investment Submission

The Agency Head reviews the investment submission and requests the Project Sponsor, Functional Manager, and/or Agency Sponsor to update the package or make changes as needed. The Agency Head then approves the investment submission and forwards it to the OCIO.

7. Review Initiative and Recommend Appropriate Action

The OCIO reviews the investment based on the established criteria. The OCIO provides any comments and/or questions to the agency. The Functional Manager works with the OCIO to address the issues and furnish details as requested, and sends an updated package to the OCIO. The OCIO forwards the updated package, along with its assessment, to an EWG for review. The EWG reviews the investment for compliance with Departmental strategic, legislative, and budgetary goals. The EWG uses standard criteria to objectively compare investments based on the data presented and scores projects using the criteria listed in **Appendix K—Strategic Investment Criteria and Bonus Point Evaluation Tools**. The EWG then forwards their investment recommendations to the EITIRB for the final decision.

8. Make Final Investment Decisions

The EITIRB reviews the EWG's recommendation and makes the final investment decisions. If the EITIRB approves the EWG's recommendation, then the decision is implemented and a review schedule for the Control Phase is established in concert with the OCIO and EWG. The initiative then moves to the Control Phase.

3.4 PORTFOLIO MANAGEMENT

To support the Department's portfolio management efforts, assessors should note substantiating evidence for their investment evaluations and scores as much as possible. Additionally, the EWG members should establish an acceptable ratio of high, medium, and low risk investments to achieve organizational objectives and future needs. The balance between the various risks of the Technical, Operational, Financial, and Organizational components are part of portfolio selection. The EWG and EITIRB should consider the ratio in different categories of investments—Corporate Administrative, Financial, and Agency—

based on their functionality. Additionally, both the EWG and EITIRB should take a strategic view of their recommendations. This view should:

- Use a broad understanding of the environment and the Department's need in identifying which investments produce the maximum results per the CCA
- Consider public and Congressional interest in IT investment decisions
- Determine which investments are of particular interest to the Department (through its strategic goals and policies), Administration, and Congress
- Consider the results of not selecting the investment
- Evaluate mandatory investments in terms of the overall pool and whether the investment must be made now or in the future
- Consider whether the investment meets minimum legal requirements or goes beyond legal mandates, leading to unnecessary costs.

3.5 EXIT CRITERIA

Prior to exiting the Select Phase, investments must have:

- Established performance goals and quantifiable performance measures
- Developed a project plan which details quantifiable objectives including an acquisition schedule, project deliverables, and projected and actual costs
- Identified costs, schedule, benefits, and risks
- Established security, telecommunications, Section 508 (IT accessibility), and architecture goals and measures
- Established an EWG and EITIRB investment review schedule for the Control Phase
- Obtained EITIRB approval to enter the Control Phase.

The Functional Manager may further develop IT investments not approved by the EWG and EITIRB for inclusion at a subsequent review.

CHAPTER 4—CONTROL PHASE

4.1 PURPOSE

The objective of the Control Phase is to ensure, through timely oversight, quality control, and executive review, that IT initiatives are conducted in a disciplined, well-managed, and consistent manner. This phase also promotes the delivery of quality products and results in initiatives that are completed within scope, on time, and within budget. During this process, senior managers regularly monitor the progress/performance of ongoing IT investments against projected cost, schedule, performance, and delivered benefits.

Although USDA usually selects new investments annually, the Control Phase is an ongoing activity. It requires the continuous monitoring of ongoing IT initiatives through the development or acquisition lifecycle. USDA reviews occur before the annual budget preparation process. Additionally, periodic summary reviews are completed based on the review schedule completed during the Select Phase.

The Control Phase is characterized by decisions to continue, modify, or terminate a program. Decisions are based on reviews at key milestones during the program's development lifecycle. The focus of these reviews changes and expands as the investments move from initial concept or design and pilot through full implementation and as projected investment costs and benefits change. The reviews focus on ensuring that projected benefits are being realized; cost, schedule and performance goals are being met; risks are minimized and managed; and the investment continues to meet strategic needs. Depending on the review's outcome, decisions may be made to suspend funding or make future funding releases conditional on corrective actions.

4.2 ENTRY CRITERIA

Prior to entering the Control Phase, investments must have:

- Established performance goals and quantifiable performance measures
- Developed a project plan which details quantifiable objectives including an acquisition schedule, project deliverables, and projected and actual costs
- Identified costs, schedule, benefits, and risks
- Established security, telecommunications, Section 508 (IT accessibility), and architecture goals and measures
- Established an EWG and EITIRB investment review schedule for the Control Phase
- Obtained EITIRB approval to enter the Control Phase.

Once the investment enters the Control Phase, the IPT will monitor the investment throughout development and report investment status to the investment's sponsors and oversight groups.

4.3 PROCESS

During the Control Phase, an investment progresses from requirements definition to implementation. Throughout the Phase, agency CIOs provide the OCIO and the EWG with investment reviews to assist them in monitoring all investments in the portfolio. Investment reviews provide an opportunity for Project Managers to raise issues concerning the IT developmental process, including security, telecommunications, Section 508, and architecture concerns.

The ability to adequately monitor IT initiatives relies heavily on the outputs from effective investment execution and management activities. The EWG, in coordination with the OCIO, develops a master milestone review calendar for evaluation and approval by the EITIRB. The OCIO maintains a control review schedule for all initiatives in the Department's IT investment portfolio and monitors investments quarterly. **Appendix M** provides an outline of the items agencies must address in writing for each quarterly or milestone control review. The EWG and EITIRB review investments at their discretion or if the cost, schedule, or performance varies more than 10 percent from expectations.

The EWG and EITIRB reviews are based on factors including the strategic alignment, criticality, scope, cost, and risk associated with all initiatives. The Project Sponsor establishes milestones as part of the investment baseline against which performance will be measured throughout the Control Phase. Agencies are expected to uphold these milestones; OMB will hold agencies responsible for meeting milestones as originally indicated in the baseline. After establishing the milestones, the Project Sponsor revises the project plan as re-

quired to meet the approved milestones. It is recommended that the project plan include a system pilot during the Control Phase because piloting helps reduce risk and provides a better understanding of costs and benefits.

Table 4-1 provides a summary of the Control Phase process, as well as the individual(s) and/or group(s) responsible for completing each process step. Each step is detailed following the table.

Process Step	Responsible Individual(s) or Group(s)
1. Establish and maintain initiative and security costs, schedule, and technical baselines.	✥ Project Sponsor
2. Maintain current initiative and security costs, schedule, technical, and general status information.	✥ Project Sponsor
3. Assess initiative progress against performance measures.	✥ Project Sponsor ✥ IPT ✥ Agency Sponsor
4. Prepare annual investment review submission package.	✥ Project Sponsor
5. Review/approve investment submission.	✥ Agency Head
6. Review initiative and recommend appropriate action.	✥ OCIO ✥ Functional Manager ✥ EWG
7. Make final investment decisions.	✥ EITIRB
8. Work with Project Sponsor to develop solutions.	✥ OCIO ✥ EWG ✥ Project Sponsor

Table 4-1. Control Phase Process Flow

1. Establish and Maintain Initiative and Security Costs, Schedule, and Technical Baselines

The Project Sponsor establishes the project management and executive plans, procedures, and practices to support initiative monitoring activities. The Project Sponsor provides periodic updates to the OCIO and/or EWG on the investment's status and security costs, schedule, and technical baselines. These baselines provide both the framework and sufficient detail to assess the status of the initiative's major milestones, decisions, work products and deliverables.

2. Maintain Current Initiative Cost and Security Costs, Schedule, Technical, and General Status Information

The Project Sponsor collects actual information on the resources allocated and expended throughout the Control Phase. The Project Sponsor compares the actual information collected to the estimated baselines developed during the Select Phase and identifies root causes for any differences. The Project Sponsor reviews the security and telecommunications infrastructure analyses for accuracy and updates cost information based on actual acquisitions or additional items included since the Select Phase. The Project Sponsor also maintains a record of any changes to the initiative's technical components, including hardware, software, security, and communications equipment. Technical component changes may trigger a new architecture review.

3. Assess Initiative Progress Against Performance Measures

As part of the periodic milestone reviews during the Control Phase, the Project Sponsor and IPT determine whether there is still a business case to continue the initiative. If the case continues to be valid, the Project Sponsor and the IPT re-screen the initiative to assess its progress against planned cost, schedule, and technical baselines. The primary purpose of this assessment is to ensure the initiative is on schedule and to help identify issues or deficiencies that require corrective action. In some instances, where the business case may no longer exist or be as strong, or if significant changes to the cost, schedule, and techni-

cal baselines are required, it may also be necessary to re-score the initiative.

To begin the control screening stage, the Project Sponsor updates the documentation set with data on planning and risk information and initiative performance, as detailed in **Table 4-2**.

Planning and Risk Information	Initiative Performance
✥ Investment description	✥ Requirements changes
✥ Project organization	✥ Risk and mitigation list
✥ Security review	✥ Current project organization
✥ Risk assessment and mitigation plan	✥ Current estimate to complete
✥ Initiative budget estimates	✥ Planned vs. actual costs, schedule, and staffing
✥ Initiative timeframe	✥ Current deliverable assignments
✥ Key milestone schedule	✥ Updated technical approach
✥ Identified tasks	✥ Updated architecture
✥ Resource identification	✥ Security risk and mitigation
✥ Work product and deliverable requirements	✥ Telecommunications risk and mitigation
✥ Technical approach and architecture	✥ Initiative action-items
✥ Telecommunications plan	✥ Quality assurance audits
✥ Quality and configuration management activities.	✥ Updated project plan
	✥ Earned value analysis.

Table 4-2. Control Screening Stage Data Requirements

The Project Sponsor and the IPT next answer two basic questions for the OCIO, EWG, and EITIRB:

- ✥ Is there still a need for the initiative?
- ✥ Does the initiative meet and will it continue to meet its planned cost, schedule, technical, telecommunications, and security baselines?

In order to answer these questions, the Project Sponsor and agency IPT need to apply the Department's control screening criteria (see **Appendix K—Strategic Investment Criteria and Bonus Point Evaluation Tools**.) If the initiative cannot be assessed affirmatively against the control screening criteria, the initiative should be re-scored.

Using the control screening criteria to answer the questions on whether the initiative has met expectations will support the decision on whether to continue with the investment, and identify any deficiencies and corrective actions needed. Updated investment information is submitted to the OCIO and EWG. The OCIO and EWG expect the Project Sponsor to determine whether the investment is meeting expectations by addressing these questions quarterly and updating the baseline status prior to the scheduled milestone reviews. Additionally, each year the investment will undergo a comprehensive control review during the annual investment review. The results of these more detailed reviews are used by the EWG and EITIRB during preparation of the Department's IT investment portfolio.

At the conclusion of control screening, the Project Sponsor and IPT determine whether the investment should be re-scored by considering the investment status (cost, schedule, risk, and architecture) and the extent to which the investment is on target or varies from the planned baselines. The level of variance determines the criticality of re-scoring the investment. Re-scoring is strongly recommended for investments that vary more than 10 percent from the original baseline in cost or schedule or if the investment risks or architectural alignment has deviated from baseline assumptions. Indicators of increased risk or architectural complexity include a high number of development change requests, reduced levels of stakeholder involvement and commitment, or significant deviation of architectural components from the baseline or the Information System Technology Architecture (ISTA) or security architecture. **Table 4-3** presents the framework that the Project Sponsor and IPT employ to recommend which IT initiatives should be re-scored.

	I High Variance (>10%)	II Medium Variance (5-10%)	III Low Variance (<5%)
Benefit			
Cost			
Schedule			
Risk (describe the type, level, impact, and probability of major risk factors)			
Architecture (describe the degree of consistency with the agency and Departmental baseline and planned ISTA IT accessibility and security architecture)			
Recommended Action	**Re-Scoring Strongly Recommended**	**Re-Scoring May Be Recommended**	**Re-Scoring Not Likely to be Necessary**

Table 4-3. Re-Scoring Framework

The Project Sponsor and agency IPT should be judicious in determining whether an investment should be re-scored, since it can be a time-consuming and resource intensive activity. For example, an investment may vary dramatically from the original baseline in one category, but if the Project Manager has a sound plan to address the variance, re-scoring may not be needed. The OCIO and EWG should also consider the effect a dramatic variance in one category may have on another category but which may not be reflected in the assessment. For example, if an investment is deviating from original technical or architectural plans, a variance in the original cost is likely and should be reflected in the variance section of the control data sheet. Additionally, the requirement for the investment may have been overtaken by events (e.g., architectural changes, regulatory changes, etc.) and the OCIO and EWG may determine if it is appropriate to re-score the initiative to determine whether it is still viable.

Based on the initiative status and identified variances, the Project Sponsor, Functional Manager, or Agency Sponsor decides whether the initiative should be re-scored. If needed, the Project Sponsor, assisted by the agency IPT, re-scores the investment and submits a revised scorecard. The revised scorecard is reflected in an initiative Control Status Report, prepared by the Project Sponsor, Functional Manager, or Agency Sponsor, and includes recommended corrective actions for the OCIO and EWG to review. Re-scored initiatives may compete against other new initiatives as part of the Select Phase. As in the Select Phase, the scorecard and other factors will assist the EWG and EITIRB in determining the investment's future status. It is expected that most initiatives will not need to be re-scored and will move forward for status review and decision.

4. Prepare Investment Review Submission Package

Each investment in the Control Phase will be evaluated during the annual investment review. In preparation for the annual investment review, major IT investments in the Control Phase should prepare a package of materials addressing the following areas in this order:

- Introduction and brief overview of the investment
- Cost vs. baseline
- Schedule vs. baseline
- Performance vs. baseline
- Validated/updated CBA
- Risk
- Security (see www.ocio.usda.gov/irm/cap_plan/security_plan/index.html for instructions on preparing security plan documentation)
- Architecture, including IT accessibility for persons with disabilities (Section 508)
- Telecommunications Plan (see www.ocio.usda.gov/irm/cap_plan/tele_plan/index.html for instructions on preparing telecommunications plan documentation)

- Secretarial priority.

5. Review/Approve Investment Submission

The Agency Head reviews the investment submission and requests the Project Sponsor, Functional Manager, and/or Agency Sponsor to update the package or make changes as needed. The Agency Head then approves the investment submission and forwards it to the OCIO.

6. Review Initiative and Recommend Appropriate Action

The OCIO assesses the investment's progress using a methodology similar to the procedures utilized during the Select Phase. The OCIO provides any comments and/or questions to the agency. The Functional Manager works with the OCIO to address the issues and furnish details as requested, and sends an updated package to the OCIO. The OCIO forwards the updated package, along with its assessment, to the EWG for review. The EWG reviews the investment and determines whether the investment has experienced any of the following potential risk factors:

- A particular task is significantly behind schedule or over budget
- Requirements and work scope are constantly changing
- A particular task on the critical path was missed, with no work around
- A major milestone, decision, or work product was missed or will be significantly delayed
- The initiative's functionality does not adequately support the mission, business, or security functions
- A major technical problem with the selected technology has surfaced as part of the change control process, and the problem resolution does not allow the investment to be developed as specified
- The organizational environment has changed and the current IT initiative is not part of the solution for meeting the business needs.

The EWG determines whether to provide continued support to the investment and forwards their recommendations to the EITIRB for the final decision

7. Make Final Investment Decisions

If the EITIRB approves an EWG's recommendation, then the decision is implemented and the initiative continues in the Control Phase or moves to the Evaluate Phase, as required. If the EITIRB does not approve the EWG recommendation, then the initiative is moved back to the EWG review phase to be reassessed.

8. Work with Project Sponsor to Develop Solutions

Once the EITIRB has approved an EWG recommendation that the IT investment be accelerated, modified, or cancelled, the OCIO and EWG should work closely with the Project Sponsor to develop a solution to any problems or issues resulting from the decision. The control scorecard should be the source for identifying the primary issues resulting from the decision. Once the OCIO, EWG, and Project Sponsor have agreed to the corrective actions, they discuss and document the criteria that will be used to resume funding. This documentation is maintained as part of the investment's record and the results are evaluated during the next annual Control Phase review or during the Evaluate Phase. Prior to the next scheduled review date, the Project Sponsor updates the investment information and initiates another preliminary assessment. This formal monitoring of investment progress, and the determination of risks and returns, continues throughout the Control Phase.

4.4 EXIT CRITERIA

Prior to exiting the Control Phase, investments must have:

- Completed investment development
- Confirmed the PIR schedule
- Obtained EITIRB approval to enter the Evaluate Phase.

CHAPTER 5—EVALUATE PHASE

5.1 PURPOSE

The purpose of the Evaluate Phase is to compare actual to expected results after an investment is fully implemented. This is done to assess the investment's impact on mission performance, identify any investment changes or modifications that may be needed, and revise the investment management process based on lessons learned. As noted in GAO's *Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-Making*, "the Evaluation Phase 'closes the loop' of the IT investment management process by comparing actuals against estimates in order to assess the performance and identify areas where decision-making can be improved."

The Evaluate Phase focuses on outcomes:

- Determining whether the IT investment met its performance, cost, and schedule objectives
- Determining the extent to which the IT capital investment management process improved the outcome of the IT investment.

The outcomes are measured by collecting performance data, comparing actual to projected performance and conducting a Post Implementation Review (PIR) to determine the system's efficiency and effectiveness in meeting performance and financial objectives. The PIR includes a methodical assessment of the investment's costs, performance, benefits, documentation, mission, and level of customer satisfaction. The PIR is conducted by the agency and results are reported to the OCIO, EWG, and EITIRB to provide a better understanding of initiative performance and assist the Project Sponsor in directing any necessary initiative adjustments. Additionally, results from the Evaluate Phase are fed back to the Pre-Select, Select, and Control Phases as lessons learned.

5.2 ENTRY CRITERIA

The Evaluate Phase begins once a system has been implemented and the system becomes operational or goes into production. Any investment cancelled prior to going into operation must also be evaluated. Prior to entering the Evaluate Phase, investments must have:

- Completed investment development
- Confirmed the PIR schedule
- Obtained EITIRB approval to enter the Evaluate Phase.

5.3 PROCESS

In the Evaluate Phase, investments move from implementation or termination to a PIR and the EITIRB's approval or disapproval to continue the investment (with or without modifications). From the time of implementation, the system is continually monitored for performance, outages, maintenance activities, costs, resource allocation, defects, problems, and system changes. System stability is also periodically evaluated. During the PIR, actual performance collected is compared to performance projections made during the Select Phase. Then lessons learned for both the investment and the CPIC process are collected and fed back to prior CPIC phases.

Table 5-1 provides a summary of the Evaluate Phase process, as well as the individual(s) and/or group(s) responsible for completing each process step. Each step is detailed following the table.

Process Step	Responsible Individual(s) or Group(s)
Conduct PIR and present results.	◆ Project Sponsor
Prepare annual investment review submission package.	◆ Project Sponsor
Review/approve investment submission.	◆ Agency Head
Review initiative's PIR results and recommend appropriate action.	◆ OCIO ◆ EWG

Table 5-1. Evaluate Phase Process Flow (Page 1 of 2)

Process Step	Responsible Individual(s) or Group(s)
Make final investment decisions.	✦ EITIRB
Evaluate IT capital investment management process.	✦ Agency ✦ OCIO ✦ EWG ✦ EITIRB

Table 5-1. Evaluate Phase Process Flow (Page 2 of 2)

1. Conduct PIR and Present Results

The PIR's timing is usually determined during the Control Phase. The PIR for a newly deployed initiative generally should take place approximately six months after the system is operational. In the case of a terminated system, it should take place immediately because the review will help to define any "lessons learned" that can be factored into future IT investment decisions and activities. In either case, before starting the PIR, the Project Sponsor develops a PIR plan that details the roles, responsibilities, and investment start and end dates for all PIR tasks.

At the heart of the PIR is the IT investment evaluation in which the Project Sponsor looks at the impact the system has had on customers, the mission and program, and the technical capability. As a result of the PIR, the Project Sponsor provides an IT Initiative Evaluation Data Sheet to the OCIO, as presented in **Figure 5-1**.

The IT investment evaluation focuses on three areas:

- **Impact to stakeholders**—The Project Sponsor typically measures the impact the system has on stakeholders through user surveys (formal or informal), interviews, and feedback studies. The evaluation data sheet highlights results.
- **Ability to deliver the IT performance measures (quantitative and qualitative)**—The system's impact to mission and program should be carefully evaluated to determine whether the system delivered expected results. This information should be compared to the investment's original performance goals. This evaluation and comparison should also include a review of the investment's security and telecommunications infrastructure performance measures.
- **Ability to meet baseline goals**—The following areas should be reviewed to determine whether the investment is meeting its baseline goals:
- *Cost*—Present actual lifecycle costs to date;
- *Return*—Present actual lifecycle returns to date;
- *Funding Sources*—Present actual funds received from planned funding sources;
- *Schedule*—Provide original baseline and actual initiative schedule;
- *Architectural Analysis*—Determine whether the initiative adhered to the Department's architectural standards or what modifications are required to ensure initiative compliance outside the original architectural baseline;
- *IT Accessibility Analysis*—Determine whether the initiative addresses accessibility for persons with disabilities, how the requirements were managed, and impact on the architecture.
- *Telecommunications Analysis*—Determine whether the initiative adhered to the Department's telecommunications standards and performance measures or what modifications are required to ensure initiative compliance outside the original baseline (for more information see www.ocio.usda.gov/irm/cap_plan/tele_plan/index.html).
- *Risk Analysis*—Identify initiative risks and how they were managed or mitigated, as well as their effects, if any; and
- *Systems Security Analysis*—Identify initiative security risks and how they were managed or mitigated as well as security performance measures (for more information see www.ocio.usda.gov/irm/cap_plan/security_plan/index.html).

SAMPLE INITIATIVE EVALUATION SHEET				
General information				
Title:				
Description:				
Project Sponsor:				
OMB Code:				
PIR Conducted By:				
Date of PIR:				
Performance Measures				
Item	**Baseline**	**Actual**	**Variance**	**Comments**
Quantitative				
Financial				
Non-Financial				
Baseline Status				
Item	**Baseline**	**Actual**	**Variance**	**Comments**
Lifecycle Cost				
Lifecycle Return				
Schedule				
Architectural Analysis				
Architectural Assessment				
IT Accessibility Analysis				
IT Accessibility Assessment				
Telecommunications Analysis				
Telecommunications Assessment				
Risk Analysis				
Risk Assessment				
Security Analysis				
System security risk assessment/mitigation review. Additional mitigation strategies and counter measures (if needed).				
Stakeholder Assessment				
General Comments				
Lessons Learned				
Project Management Assessment				
Technical Assessment				

Figure 5-1. IT Initiative Evaluation Data Sheet

After the post-implementation data has been collected and reviewed, the Project Sponsor prepares and makes a formal PIR presentation to the OCIO. (For initiatives with a variance of greater than 10 percent from the original baseline the initiative may need to be re-scored in light of changing business, organizational, financial, or technical conditions; these new scores are included in the PIR.) The presentation should summarize the initiative evaluation and provide a summary of rec-

ommendations for presentation to an EWG and the EITIRB.

2. Prepare Annual Investment Review Submission Package

Each investment in the Evaluate Phase will be assessed during the annual investment review. To prepare for the annual investment reviews, the Project Sponsor develops a package of materials that address the PIR strategic investment criteria, the strategic investment criteria for security and infrastructure/architecture, and the bonus point for Secretarial priority. The package of materials should address the following areas in this order:

- Introduction and brief overview of the investment
- PIR
- Validated/updated CBA
- Security (see www.ocio.usda.gov/irm/cap_plan/security_plan/index.html for instructions on preparing security plan documentation)
- Architecture, including IT accessibility for persons with disabilities (Section 508)
- Telecommunications Plan (see www.ocio.usda.gov/irm/cap_plan/tele_plan/index.html for instructions on preparing telecommunications plan documentation)
- Secretarial priority.

3. Review/Approve Investment Submission

The Agency Head reviews the investment submission and requests the Project Sponsor, Functional Manager, and/or Agency Sponsor to update the package or make changes as needed. The Agency Head then approves the investment submission and forwards it to the OCIO.

4. Review Initiative's PIR Results and Recommend Appropriate Action

The OCIO reviews the PIR results and provides any comments and/or questions to the agency. The Functional Manager works with the OCIO to address the issues and furnish details as requested, and sends an updated package to the OCIO. The OCIO forwards the updated package, along with its evaluation, to an EWG for review. The EWG reviews the investment and makes a recommendation that the investment's Project Sponsor take one of the following actions:

- Continue the investment as planned
- Terminate the investment
- Modify the investment as recommended.

5. Make Final Investment Decisions

The EITIRB reviews an EWG's recommendation and makes the final investment decisions. The resulting decision is then relayed by letter to the Under/Assistant Secretary, Agency Head, and Project Sponsor.

6. Evaluate IT Capital Investment Management Process

An EWG may also recommend that the OCIO revise the CPIC process based on PIR results. A summary of the PIR activities and lessons learned are then presented by the OCIO to the EWG and EITIRB.

Following the completion of each phase, the OCIO and agencies document the strengths and weaknesses of the CPIC process. The information gathered in this evaluation is used to improve the CPIC process, by maintaining and improving the factors associated with improved initiative success rates and revising or removing the non-value added steps. These process improvements are discussed as a regular agenda item for the EWG. Agencies can use **Table 5-2** to record observations and forward them to the OCIO as necessary. Agencies can add any appropriate comments as deemed necessary. The following are examples of things agencies can consider when addressing each phase:

- Initiative Development
  - Documentation set
  - General/descriptive information
  - Financial information
  - Security/ISTA models.
- Screen
  - Viability criteria
  - Viability considerations
  - Initiative designation.

- Score
  - Mission criteria
  - Risk
  - ROI.
- Pre-Select
  - Agency process
  - OCIO/EWG review
  - EITIRB endorsement.
- Select
  - Agency process
  - OCIO/EWG review
  - EITIRB endorsement
  - Security review.
- Control
  - Milestone review format
  - OCIO/EWG/corrective actions
  - Security analysis.
- Evaluate
  - PIR content
  - PIR execution
  - PIR recommendations
  - Security performance.
- Steady-State
  - System assessment
  - Technology assessment
  - Operations and Maintenance (O&M) review.

To capture lessons learned, the Project Sponsor develops a management report and submits it to the OCIO. All failures and successes are collected and shared to ensure that future initiatives learn from past experiences. A high-level assessment of management techniques including organizational approaches, budgeting, acquisition and contracting strategies, tools and techniques, and testing methodologies is essential to establish realistic baselines and to ensure the future success of other IT initiatives. The management report, including lessons learned, follows the outline provided in **Figure 5-2**.

The OCIO schedules formal and informal sessions to review the management report and collect additional information about the overall effectiveness of the process. The OCIO works with the Project Sponsor, Agency Portfolio Managers, and an EWG to conduct trend analyses of the process, validate findings, and adjust the process accordingly. The OCIO also sponsors workshops and discussion groups to improve the CPIC process and ensure lessons learned are applied throughout the Department. The OCIO then works with the agency to develop, recommend, and implement modifications to improve the process.

5.4 Exit Criteria

Prior to exiting the Evaluate Phase, investments must have:

- Conducted a PIR
- Established an Operations and Maintenance (O&M) and operational performance review schedule
- Obtained EITIRB approval to enter the Steady-State Phase.

	Initiative Development	Screen	Score	Pre-Select	Select	Control	Evaluate	Steady-State
Was each phase conducted at the appropriate time in the process?								
Was the data content sufficient to move forward to the next phase in the process?								
Were there enough resources (i.e., people) allocated for each phase in the process? Were the right types of people and expertise involved?								
Was there an acceptable level of information flow?								
Was I-TIPS able to support the activity in each phase in the process?								
List suggested corrective actions for any phase in the process.								

Comments:

Table 5-2. IT Process Evaluation Data Sheet

INVESTMENT MANAGEMENT REPORT
Initiative Title:
Project Sponsor:
Date of PIR:
Background (Description of Project)
Management Approach
Organizational Structure
Resources
Acquisition Strategy
Contracting Strategy
Security Strategy
Documentation
Technical Approach
Architecture (description, adherence to ISTA, and IT accessibility requirements, security, telecommunications, and architecture standards)
Development (if applicable)
Testing
Lessons Learned
List of lessons learned
Recommended best practices

Figure 5-2. Investment Management Report Data Sheet

CHAPTER 6—STEADY-STATE PHASE

6.1 PURPOSE

The Steady-State Phase provides the means to assess mature investments, ascertain their continued effectiveness in supporting mission requirements, evaluate the cost of continued maintenance support, assess technology opportunities, and consider potential retirement or replacement of the investment. The primary review focus during this Phase is on the mission support, cost, and technological assessment. Process activities during the Steady-State Phase provide the foundation to ensure mission alignment and support for system and technology succession management.

6.2 ENTRY CRITERIA

Prior to entering the Steady-State Phase, investments must have:

- Conducted a PIR
- Established an O&M and operational performance review schedule
- Obtained EITIRB approval to enter the Steady-State Phase.

6.3 PROCESS

During the Steady-State Phase, mission analysis is used to determine whether mature systems are optimally continuing to support mission and user requirements. An assessment of technology opportunities and an O&M Review are also conducted. **Appendix D** provides a template for conducting Steady-State investment reviews.

Table 6-1 provides a summary of the Steady-State Phase process, as well as the individual(s) and/or group(s) responsible for completing each process step. Each step is detailed following the table.

Process Step	Responsible Individual(s) or Group(s)
1. Analyze mission.	◆ Project Sponsor ◆ Agency Sponsor
2. Assess user/customer satisfaction.	◆ Project Sponsor
3. Assess technology.	◆ Project Sponsor
4. Review O&M.	◆ Project Sponsor ◆ Agency Sponsor
5. Prepare investment review submission package.	◆ Project Sponsor
6. Review/approve investment submission.	◆ Agency Head
7. Review initiative and recommend appropriate action.	◆ OCIO ◆ EWG
8. Make final investment decisions.	◆ EITIRB

Table 6-1. Steady-State Process Flow

1. Analyze Mission

The Project Sponsor and Agency Sponsor conduct a mission analysis to determine if the system is continuing to meet mission requirements and needs, and supports the USDA's evolving strategic direction. The mission analysis process identified in the Pre-Select Phase and the Mission Needs Statement provide a framework to assist in the mission analysis for the Steady-State Phase. This includes an analysis of performance measures accomplishment.

2. Assess User/Customer Satisfaction

The Project Sponsor assesses user and customer satisfaction with, and acceptance and support for, the existing system. There are several means to conduct the user/customer assessment, including conducting a user/customer survey, assessing comments and user/customer community inputs, or analyzing usage trends. Some or all of these activities may be beneficial to assist in determining continued support for the system, additional user/customer need, or improvement opportunities. This information should be used to assess and update the investment's performance measures.

3. Assess Technology

The Project Sponsor assesses the continuing ability of the investment to meet the system's performance goals.
The Project Sponsor assesses the technology and determines potential opportunities to improve performance, reduce costs, support the USDA enterprise architecture, and to ensure alignment with USDA's strategic direction. An assessment of security and telecommunications should also be supplied.

4. Review O&M

The Project Sponsor and Agency Sponsor conduct an O&M review to assess the cost and extent of continued maintenance and upgrades. The O&M review should include a trend analysis of O&M costs and a quantification of maintenance releases. Costs for government full-time equivalents (FTEs) should be included in all cost estimates and analysis.

5. Prepare Investment Review Submission Package

In preparation for the annual investment review, the Project Sponsor updates actual costs and benefits for the investment and prepares the Steady-State submission package. The package of materials should address the following areas in this order:

- Introduction and brief overview of existing system
- Mission Analysis Summary
- User/Customer Assessment Summary
- Performance Measures Assessment
- Technology Assessment
- O&M Cost Analysis
- Updated CBA.

6. Review/Approve Investment Submission

The Agency Head reviews the investment submission and requests the Project Sponsor, Functional Manager, and/or Agency Sponsor to update the package or make changes as needed. The Agency Head then approves the investment submission and forwards it to the OCIO.

7. Review Initiative and Recommend Appropriate Action

The OCIO reviews the investment submission with an emphasis on strategic mission alignment, cost, technology succession, and performance measures. The OCIO provides any comments and/or questions to the agency. The Functional Manager works with the OCIO to address the issues and furnish details as requested, and sends an updated package to the OCIO. The OCIO forwards the updated package, along with its assessment, to an EWG for review. The EWG reviews the investment to determine whether it can optimally continue to support mission/user requirements and the Department's strategic direction. The EWG determines whether the investment should continue in the Steady-State Phase, return to a previous phase due to the extent of system modifications, be replaced, or be retired. The EWG then forwards their recommendations to the EITIRB.

8. Make Final Investment Decisions

The EITIRB approves or disapproves the EWG's recommendation and directs the Project Sponsor how to proceed.

6.4 EXIT CRITERIA

Prior to exiting the Steady-State Phase, investments must have obtained the EITIRB's direction whether to dispose, retire, or replace the system.

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

APPENDICES

APPENDIX A—BOARD PROCEDURES

The reviews by senior-level Boards are integral to the success of USDA's CPIC process. The Boards ensure compliance with guidance from Congress, OMB, and GAO, as well as apply sound business practices to the planning, acquisition, and operation of large IT investments. The following sections contain the EITIRB Charter.

A.1 EITIRB CHARTER

I. Purpose

The purpose of this Charter is to define the authority, membership, roles and responsibilities of the Executive Information Technology Investment Review Board (EITIRB), and its relationships to other internal and external bodies.

II. Background

The Clinger-Cohen Act dramatically changes the way Federal agencies must acquire and manage information technology (IT). The Act expands upon the requirement, initially introduced by the Government Performance and Results Act (GPRA), that agency IT investments be directly linked to, and supportive of, program objectives.

The Clinger-Cohen Act requires executive agencies to develop a capital planning and investment control process for making technology, budget, financial and program management decisions. While each phase of a sound investment process has its own requirements for successful implementation, there are some overall organizational attributes which are critical to successful investment evaluation:

- Senior management attention
- Overall mission focus
- A comprehensive, enterprise-wide approach to technology investment.

III. Authority

On July 1, 1996, Secretary Glickman approved the establishment of the EITIRB to coordinate and prioritize the Department's IT investments, and to provide a critical link between IT and agency missions. The EITIRB, made up of senior-level managers, will ensure that USDA technology investments are managed as strategic business resources supporting efficient and effective program delivery. Additionally, the Board will assure that the Department's IRM Program remains in compliance with the requirements of the Clinger-Cohen Act, GPRA, and other legislation which addresses information technology issues.

IV. Membership

The EITIRB is comprised of the Department's senior managers, as follows:

- Deputy Secretary—Chair
- Chief Information Officer—Vice-Chair and Executive Secretary
- Chief Financial Officer
- General Counsel
- Director of the Office of Budget and Program Analysis
- Under Secretary for Farm and Foreign Agricultural Service
- Under Secretary for Food, Nutrition, and Consumer Service
- Under Secretary for Food Safety
- Under Secretary for Natural Resources and Environment
- Under Secretary for Research, Education, and Economics
- Under Secretary for Rural Development
- Assistant Secretary for Administration
- Assistant Secretary for Marketing and Regulatory Programs

At the Board's discretion, ex-officio members may be named to provide specialized expertise and advice.

V. Roles and Responsibilities

The EITIRB will approve new information technology investments and evaluate existing projects and operational systems to create a USDA IT investment portfolio which best supports the Department's missions and program delivery processes. The Board will use a standard set of criteria, developed by the OCIO, and approved by the Board, to assemble this portfolio and evaluate agency and Department-wide IT initiatives. Criteria will include a consideration of Departmental or

Government-wide impact, visibility, cost, risk, architecture, and standards.

In the scope of EITIRB activities, information technology investment encompasses all investments involving information technology and information resources as defined in the Clinger-Cohen Act, including equipment, IRM services, information or application system design, development, and maintenance, regardless of whether such work is performed by government employees or contracted out.

VI. Meetings and Communications

EITIRB meetings will be held quarterly or more frequently subject to the call of the Chair, as circumstances warrant. The Executive Secretary will prepare the agenda for all meetings, prepare and distribute minutes of all meetings, and perform other scheduling, correspondence, and communications functions for the EITIRB. An agenda and notice of meeting will be provided to EITIRB members by the Executive Secretary 10 working days prior to meetings. Attendance at meetings may be in person or any other two-way, interactive communications means, such as conference call or video teleconference. Members may also be represented by a designated alternate at the Deputy level and may have a proxy cast their votes.

The minutes of each meeting will be recorded and distributed by the Executive Secretary. Draft minutes will be distributed to Board members within 5 working days of each meeting. Final minutes will be distributed along with the agenda for each upcoming meeting.

VII. Voting

The EITIRB shall make decisions, including revisions to this charter, by voting. In order for a vote to occur, a quorum must be present. A quorum shall consist of two-thirds of the voting members in person or by proxy. Each member shall have one vote; the Chair shall retain the right to abstain from voting.

VIII. Key Relationships

The CIO will maintain a close relationship with the IRM Council, the IRM Council Board, and other appropriate organizations within and outside USDA, and solicit their advice and counsel for selecting issues to bring before the EITIRB.

APPENDIX B—CPIC PROCESS CHECKLIST

Pre-Select Phase—What are the business needs for the investments?

- ❑ The Agency Head identifies a Project Sponsor.
- ❑ The Functional Manager conducts a mission analysis.
- ❑ The Functional Manager develops the investment's concept.
- ❑ The Functional Manager prepares the preliminary business case.
- ❑ The Functional Manager and the Agency Sponsor prepare the annual investment review submission package.
- ❑ The Agency Head reviews and approves the investment submission.
- ❑ The OCIO and EWG review the initiative and recommend an appropriate action to the EITIRB.
- ❑ The EITIRB makes the final investment decisions.

Select Phase—How do you know you have selected the best investments?

- ❑ The Functional Manager reviews and updates the Mission Needs Statement.
- ❑ The Agency Head approves IPT membership.
- ❑ The Project Sponsor identifies the funding source(s) and obtains agency approvals.
- ❑ The Project Sponsor develops supporting materials for major investments.
- ❑ The Project Sponsor prepares the investment review submission.
- ❑ The Agency Head reviews and approves the investment submission.
- ❑ The OCIO and EWG review the initiative and recommend an appropriate action to the EITIRB.
- ❑ The EITIRB makes the final investment decisions.

Control Phase—What are you doing to ensure that the investments will deliver the benefits projected?

- ❑ The Project Sponsor establishes and maintains initiative and security costs, schedule, and technical baselines.
- ❑ The Project Sponsor maintains current initiative and security costs, schedule, technical, and general status information.
- ❑ The Project Sponsor, IPT, and Agency Sponsor assess the initiative's progress against performance measures.
- ❑ The Project Sponsor prepares the annual investment review submission package.
- ❑ The Agency Head reviews and approves the investment submission.
- ❑ The OCIO and EWG review the initiative and recommend an appropriate action to the EITIRB.
- ❑ The EITIRB makes final investment decisions.
- ❑ The OCIO and EWG work with the Project Sponsor to develop solutions to identified issues.

Evaluate Phase—Based on your evaluation, did the investments deliver what you expected?

- ❑ The Project Sponsor conducts a PIR and presents results to the OCIO, EWG, and EITIRB.
- ❑ The Project Sponsor prepares the annual investment review submission package.
- ❑ The Agency Head reviews and approves the investment submission.
- ❑ The OCIO and EWG review and assess the PIR results and recommend an appropriate action to the EITIRB.
- ❑ The EITIRB makes final investment decisions.
- ❑ The agency, OCIO, EWG and EITIRB evaluate the IT capital investment management process.

Steady State Phase—Do the investments still cost-effectively support requirements?

- ❑ The Project Sponsor and the Agency Sponsor analyze the mission.
- ❑ The Project Sponsor assesses user/customer satisfaction.

- ❑ The Project Sponsor conducts a technology assessment.
- ❑ The Project Sponsor and the Agency Sponsor review O&M costs.
- ❑ The Project Sponsor prepares the annual investment review submission package.
- ❑ The Agency Head reviews and approves the investment submission.
- ❑ The OCIO and EWG review the initiative and recommend an appropriate action to the EITIRB.
- ❑ The EITIRB makes final investment decisions.

APPENDIX C—MISSION NEEDS STATEMENT

C.1 PURPOSE

The Mission Needs Statement (MNS) is completed during the Pre-Select Phase. It is a summary document that describes the operational problem and presents the major decision factors that an EWG and EITIRB should evaluate in considering the need and proposed investment.

The following section provides a template for preparing the Mission Needs Statement. Detailed quantitative and analytical information should be included as attachments.

C.2 MISSION NEED STATEMENT TEMPLATE

General Instructions for Completing the Mission Need Statement

The Mission Needs Statement is created during the Pre-Select Phase. It must analytically justify: (1) the need for action to resolve a shortfall in the agency's ability to provide the services needed by its users or customers, or (2) the need to explore a technological opportunity for performing agency missions more effectively. The Mission Needs Statement must be derived from rigorous mission analysis (i.e., continuous analysis of current and forecasted mission capabilities in relationship to projected demand for services) and must contain sufficient quantitative information to establish and justify the need. Extensive performance analysis should be completed and capability shortfalls should be identified before preparing the Mission Needs Statement.

1. Administrative Information

a. MNS Title:
b. MNS Number:
c. Originator:
d. Originator's Organization:
e. Originator's Phone Number:
f. Sponsoring Line of Business:
g. Sponsor's Focal Point:
h. Sponsor's Focal Point Phone Number:
i. Submission Date:
j. Revision Number:
k. Revision Date:

Signature:

_____ _____
Agency Head Date

2. Impact on USDA Mission Areas

Briefly describe the impact of the capability shortfall or technological opportunity with respect to performance metrics, goals, or standards in USDA mission areas. Performance goals are delineated in the USDA and agency strategic plan, business plans, and annual performance plan prepared in compliance with GPRA (Public Law 103-62). This should be linked directly to the USDA strategic plan and the agency strategic plan.

3. Needed Capability

Describe the functional capability needed or technological opportunity. Describe needed capability in terms of functions to be performed or services to be provided. Cite any Congressional, Secretary, or other high-level direction, such as international agreements, to support the needed capability. Cite any statutory or regulatory authority for the need. Provide validated growth projections based on operational analysis.

This is not a description of an acquisition program (i.e., this is not the details of a particular hardware or software solution). Do not describe needed capability in terms of a system or solution but rather focus on the business/mission aspects.

4. Current and Planned Capability

Describe quantitatively the capability of systems, facilities, equipment, or other assets currently deployed or presently planned and funded to meet the mission need. Where applicable, use tables to present the information. If this Mission Needs Statement proposes to replace an existing investment, provide existing system name and OMB number. References should be made to the existing architecture and asset inventory. Provide back up data in attachments.

5. Capability Shortfall

Describe the capability shortfall and explain the performance analysis that was used to identify and quantify the extent of the shortfall over time. Define, in detail, the specific limitations of current facilities, equipment, or service to meet projected demand and the needed capability. Explain the criteria used to measure performance. Include appropriate graphs, tables, and formulas to define the extent of the shortfall. Identify databases and other data sources upon which the analysis is based. Identify models and methodologies used to quantify the shortfall.

Alternately, describe the technological opportunity in terms of improved USDA productivity, facility availability, operational effectiveness, or improved efficiency. In attachments, explain the analysis used to quantify the magnitude of the opportunity, and identify and describe databases, models, and methodologies used to support the analysis.

Provide specific operational and performance analyses, quantitative projections, maintenance indicators, reports, recommendations, or other supporting data, as attachments.

6. Impact of Not Approving the Mission Need

Describe the impact if this capability shortfall is not resolved relative to the USDA's ability to perform mission responsibilities. Define the expected change in mission performance indicators if the capability shortfall is not resolved.

Include as attachments appropriate graphs, tables, and formulas used to quantify the impact on performance. Identify databases, other sources of data, models, and methodologies used to support the impact analysis. Explain performance analyses used to quantify the impact of not implementing the opportunity, and identify the external factors (such as validated growth projections) used to support the analysis.

7. Benefits

Summarize the mission analysis determination of benefits. Describe the benefits accrued by the needed capability or technological opportunity. Benefits may accrue from more efficient operations, improved responsiveness to customers, lower operational costs, or other savings.

The summary of accrued benefits should describe ground rules and assumptions, benefits, estimating methods, sources, and models. Include as attachments appropriate graphs, tables, and formulas used to quantify the benefits.

8. Timeframe

Identify when the capability shortfall will seriously affect the Department's ability to perform its mission if no action is taken. Establish when action must be taken to avoid the adverse impact on services that will result. Explain the performance analysis used to quantify the extent of the impact over time.

9. Criticality

State the priority of this mission need relative to other Departmental needs. First, define the priority of this need relative to other needs within the mission area, and then define the priority relative to needs across all mission areas. Characterize whether the mission need identifies internal USDA capability shortfalls or mainly shortfalls in servicing the customer community.

10. Long Range Resource Planning Estimate

Provide a rough estimate of the resources that will likely be committed to this mission need in competition with all others, within the constraint of realistic projections of future budget authority.

APPENDIX D—STEADY-STATE INVESTMENT REVIEW TEMPLATE

D.1 PURPOSE

Investments are reviewed during the Steady-State Phase to ascertain their continued effectiveness in supporting mission requirements, evaluate the cost of continued maintenance support, assess technology opportunities, and consider potential retirement or replacement of the investment. The following section provides a template for the package of materials required for a Steady-State Investment Review. Detailed quantitative and analytical information should be included as attachments.

D.2 STEADY-STATE INVESTMENT REVIEW TEMPLATE

Investment Title—Name/title of investment

Agency—Name of sponsoring agency or activity

1. Administrative Information

a. **Date of PIR**—Date of the most recent PIR or the date of system deployment/implementation
b. **Originator**—Name, phone number, and e-mail address of document originator
c. **Project Sponsor**—Name, phone number, and e-mail address of the Project Sponsor
d. **Submission Date**—Date of initial document origination
e. **Revision Number**—Document revision number
f. **Revision Date**—Date of latest revision

Signature:

_____ _____
Agency Head Date

2. Introduction/Overview of Existing System

Provide a brief summary of the investment to include mission areas supported, key capabilities, customer/user base, key system or infrastructure interfaces, and dependencies.

3. Mission Analysis

Provide a summary of the mission analysis to determine if the system is continuing to meet mission requirements and needs, and supports the USDA's evolving strategic direction. This should include a discussion of the mission needs being supported. The mission analysis process identified in the Pre-Select Phase and the Mission Needs Statement (see **Appendix C—Mission Needs Statement**) provides a framework to assist in the mission analysis for the Steady-State Phase.

Include the investment's performance measurement projected baseline and actual performance measurement information to determine if the investment is continuing to provide realizable benefits.

4. User/Customer Assessment

Assess user and customer satisfaction. Include a discussion of results of user/customer surveys, user/customer community inputs, or analysis of usage trends. Supporting documentation, reports, or graphs should be provided as an attachment. Some or all of these activities may be beneficial to assist in determining continued support for the system, additional user/customer needs, or improvement opportunities.

5. Performance Measures Assessment

Assess investment performance against approved performance measures. Performance data is collected, evaluated, and compared to performance projections made during the Select Phase. The evaluation should indicate needed adjustments to the IT investment or performance measures. Supporting documentation should be provided as an attachment.

6. Technology Assessment

Assess the technology to determine potential opportunities to improve performance, reduce costs, support the USDA enterprise architecture, and ensure alignment with USDA's strategic direction. Describe quantitatively the capability of systems, facilities, equipment, or other assets currently deployed or presently planned and funded to meet the mission need. Where applicable, use tables to present the information and provide any back-up data in attachments. References should be made to the existing architecture and asset inventory.

7. O&M Cost Analysis

Conduct an O&M review to assess the cost and extent of continued maintenance and upgrades. The O&M review should include a trend analysis of O&M costs and a quantification of maintenance releases. Include any supporting graphs and spreadsheets. Costs for government FTEs should be included in all cost estimates and analysis.

8. Recommendations

Describe agency recommended actions—continue in the Steady-State Phase, terminate or dispose of the existing system, or consider new investment alternatives.

APPENDIX E—COST-BENEFIT ANALYSIS

E.1 PURPOSE

Current laws and regulations require agencies to conduct a CBA prior to deciding whether to initiate, continue, or implement an IT investment. The level of detail required varies and should be commensurate with the size, complexity, and cost of the proposed investment. This appendix provides a layout of a CBA for a very large, complex, and costly IT investment. A scaled down version is appropriate for a smaller, less costly investment.

The CBA supports decision-making and helps ensure resources are effectively allocated to support mission requirements. The CBA should demonstrate that at least three alternatives were considered and the chosen alternative is the most cost-effective, within the context of budgetary and political considerations. Possible alternatives include:

- In-house development versus contractor development,
- In-house operation versus contractor operation,
- Current operational procedures versus new operational procedures, or
- One technical approach versus another technical approach.

The CBA should include comprehensive estimates of the projected benefits and costs for each alternative. Costs, tangible benefits, and intangible benefits (benefits which cannot be valued in dollars) should be included. Intangible benefits should be evaluated and assigned relative numeric values for comparison purposes. Sunk costs (costs incurred in the past) and realized benefits (savings or efficiencies already achieved) should not be considered since past experience is relevant only in helping estimate future benefits and costs. Investments should be initiated or continued only if the projected benefits exceed the projected costs.

A CBA should be performed for each investment alternative to enable the evaluation and comparison of alternatives. However, some mandatory systems will not provide net benefits to the government. In such cases, the lowest cost alternative should be selected. If functions are to be added to a mandatory system, though, the additional functions should provide benefits to the government.

E.2 PROCESS

A CBA should be completed or updated at the following lifecycle milestones:

- Proposal initiation (Pre-Select Phase)
- EITIRB proposal consideration (Select Phase)
- EITIRB initiative review (annually during the Control Phase)
- Initial fielding (Evaluation Phase)
- Post-Implementation Review (Evaluation Phase)
- Operations and Maintenance review (Steady-State Phase)
- Annually for “major system” CPIC review.

The Project Sponsor ensures the CBA is done. The Project Sponsor can obtain expertise from the IPT in systems development and operation, budget, finance, statistics, procurement, architecture, and work processes, as needed.

The CBA process can be broken down into the following steps:

1. Determine/define objectives
2. Document current process
3. Estimate future requirements
4. Collect cost data for alternatives
5. Choose at least three alternatives
6. Document CBA assumptions
7. Estimate costs
8. Estimate benefits
9. Discount costs and benefits
10. Evaluate alternatives
11. Perform sensitivity analysis
12. Compare investments.

Each of these steps is detailed in the following sections. The numerical examples provided are from a variety of sources and do not relate to one specific investment.

1. Determine/Define Objectives

The CBA should include a problem definition; pertinent background information such as staffing, system history, and customer satisfaction data; and a list of investment objectives that identify how the system will improve the work process and support the mission.

2. Document Current Process

The current process should be thoroughly documented and address these areas:

- **Customer Service**—Each customer's role and services required should be clearly documented and quantified, if possible (e.g., in an average month, a customer inputs two megabytes (MB) of data and spends 10 hours on database maintenance).
- **System Capabilities**—Resources required for peak demand should be listed. For example, 100 MBs of disk storage space and Help Desk personnel to support 50 users.
- **System Architecture**—The hardware, software, and physical facilities required should be documented, including information necessary for determining system costs, expected future utility of items, and the item owner/lessor (i.e., government or contractor). **Table E-1** displays the information desired.
- **System Costs**—Current costs provide the CBA baseline. **Table E-2** addresses the cost elements for most systems. However, a particular system may not include all elements identified within a category and may include some activities not shown.

Hardware	Software	Physical Facilities
Manufacturer Make/Model/Year Cost Power requirements Expected life Maintenance requirements Operating characteristics (e.g., size, speed, capacity, etc.) Operating systems supported	Manufacturer Name Version number Year acquired License term Hardware requirements Cost (annual or purchase)	Location Size Capacity Structure type Availability Annual cost

Table E-1. System Architecture Information Requirements

Cost Category	Cost Elements
Equipment, Leased or Purchased	Supercomputers, mainframes, minicomputers, microcomputers, disk drives, tape drives, printers, telecommunications, voice and data networks, terminals, modems, data encryption devices, and facsimile equipment.
Software, Leased or Purchased	Operating systems, utility programs, diagnostic programs, application programs, and commercial-off-the-shelf (COTS) software.
Commercial Services	Commercially-provided services, such as teleprocessing, local batch processing, on-line processing, Internet access, electronic mail, voice mail, centrex, cellular telephone, facsimile, and packet switching.
Support services (Contractor Personnel)	Commercially-provided services to support equipment, software, or services, such as maintenance, source data entry, training, planning, studies, facilities management, software development, system analysis and design, computer performance evaluation, and capacity management.
Supplies	Any consumable item designed specifically for use with equipment, software, services, or support services identified above.

Table E-2. Cost Elements for Systems (Page 1 of 2)

Cost Category	Cost Elements
Personnel (compensation and benefits)	Includes the salary (compensation) and benefits for government personnel who perform IT functions 51% or more of their time. Functions include but are not limited to program management, policy, IT management, systems development, operations, telecommunications, computer security, contracting, and secretarial support. Personnel who simply use IT assets incidental to the performance of their primary functions are not included.
Intra-governmental services	All IT services within agencies, and between executive branch agencies, judicial and legislative branches, and State and local governments.

Table E-2. Cost Elements for Systems (Page 2 of 2)

3. Estimate Future Requirements

Future customer requirements determine the system capabilities and architecture, and ultimately affect system costs and benefits. Two items to consider are:

- **Lifecycle Time**—Determine the system lifecycle, or when the system is terminated and replaced by a system with significant changes in processing, operational capabilities, resource requirements, or system outputs. Large, complex systems should have a lifecycle of at least five years, and no more than ten to 12 years.
- **Lifecycle Demands**—Identify the most appropriate demand measures and use the measures to determine previous year demands, calculate the change in demand from year to year, average the demand change, and use the average to make predictions. In a complex situation, more sophisticated tools, such as time-series and regression analysis, may be needed to forecast the future.

4. Collect Cost Data

Data can be collected, from the following sources, to estimate the costs of each investment alternative:

- **Historical Organization Data**—If contracts were used to provide system support in the past, they can provide the estimated future cost of leasing and purchasing hardware and hourly rates for contractor personnel. Contracts for other system support services can provide comparable cost data for the development and operation of a new system.
- **Current System Costs**—Current system costs can be used to price similar alternatives.
- **Market Research**—Quotes from multiple sources, such as vendors, Gartner Group, IDC Government, and government-wide agency contracts (GWACS), can provide an average, realistic price.
- **Publications**—Trade journals usually conduct annual surveys that provide general cost data for IT personnel. Government cost sources include the General Services Administration (GSA) pricing schedule and the OMB Circular A-76, “Performance of Commercial Activities” supplemental listing of inflation and tax rates.
- **Analyst Judgment**—If data is not available to provide an adequate cost estimate, the CBA team members can use judgment and experience to estimate costs. To provide a check against the estimates, discuss estimated costs with other IT professionals.
- **Special Studies**—Special studies can be conducted to collect cost data for large IT investments. For example, the Federal Aviation Administration (FAA) used three different in-house studies to provide costs for software conversion, internal operations, and potential benefits. These data sources became the foundation for a CBA.

5. Choose at Least Three Alternatives

A CBA should present at least three alternatives, with one alternative being to continue with no change. Each viable technical approach should be included as an alternative. However, the number of technical approaches may be limited if only one or two are compatible with the architecture or if some approaches are not feasible for reasons other than costs and benefits.

6. Document CBA Assumptions

It is important to document all assumptions and, if possible, justify them on the basis of prior experiences or actual data. This can be an opportunity to explain why some alternatives are not included. If an alternative is eliminated because it is not feasible, the assumption should be clearly explained and justified.

7. Estimate Costs

Many factors should be considered during the process of estimating costs for alternatives. Full lifecycle costs for each competing alternative should be included and the following factors should be addressed:

- **Activities and Resources**—Identify and estimate the costs associated with the initiation, design, development, operation, and maintenance of the IT system.
- **Cost Categories**—Identify costs in a way that relates to the budget and accounting processes. The cost categories should follow current USDA object class codes.
- **Personnel Costs**—Personnel costs are based on the guidance in OMB Circular A-76, "Supplemental Handbook, PART II—Preparing the Cost Comparison Estimates." Government personnel costs include current salary by location and grade, fringe benefit factors, indirect or overhead costs, and General and Administrative costs.
- **Depreciation**—The cost of each tangible capital asset should be spread over the asset's useful life (i.e., the number of years it will function as designed). OMB prefers that straight-line depreciation be used for capital assets.
- **Annual Costs**—All cost elements should be identified and estimated for each year of the system lifecycle. This is necessary for planning and budget considerations. **Table E-3** illustrates the cost estimates for an Investment Initiation activity.

Activities/Cost Categories	Problem Definition	Work Process Evaluation	Requirements Definition	Security Plan	Performance Measures	Cost Benefit Analysis	Total
Hardware							
Software							
Services							
Support Services		10,000	4,000	1,000	6,000	3,000	24,000
Supplies		100	100	0	100	100	400
Personnel	5,000	10,000	6,000	500	5,000	8,000	34,500
Inter-Agency Services							
Total	**5,000**	**20,100**	**10,100**	**1,500**	**11,100**	**11,100**	**58,900**

Table E-3. Sample Cost Estimates for an Investment Initiation Activity

The costs for each year can be added to provide the estimated annual costs over the investment's life. For example, **Table E-4** provides the total estimated costs for a ten-year investment. In the first year in-house staff and contractors define the problem, evaluate the work process, define processing requirements, prepare the CBA, develop a request for proposals (RFP), and issue a contract for the system development. In the second year a contractor designs and implements the system.

The next eight years reflect operational and maintenance costs for equipment, software, in-house personnel, and contractor personnel. Years five and six also reflect in-house acquisition costs for establishing a new five-year contract for system maintenance and help desk support.

Year	Startup	Acquisition	Development	Operation	Maintenance	Total
1	100,000	100,000				200,000
2			800,000			800,000
3				200,000	80,000	280,000
4				200,000	60,000	260,000
5		50,000		200,000	50,000	300,000
6		50,000		200,000	50,000	300,000
7				200,000	40,000	240,000
8				200,000	30,000	230,000
9				200,000	30,000	230,000
10				200,000	30,000	230,000
Total	**100,000**	**200,000**	**800,000**	**1,600,000**	**370,000**	**3,070,000**

Table E-4. Sample System Lifecycle Cost Estimates

8. Estimate Benefits

The following six activities are completed to identify and estimate the value of benefits:

- **Define Benefits**—Benefits are the services, capabilities, and qualities of each alternative, and can be viewed as the return from an investment. The following questions will help define benefits for IT systems and enable alternative comparisons:
  - *Accuracy*—Will the system improve accuracy by reducing data entry errors?
  - *Availability*—How long will it take to develop and implement the system?
  - *Compatibility*—How compatible is the proposed alternative with existing procedures?
  - *Efficiency*—Will one alternative provide faster or more accurate processing?
  - *Maintainability*—Will one alternative have lower maintenance costs?
  - *Modularity*—Will one alternative have more modular software components?
  - *Reliability*—Does one alternative provide greater hardware or software reliability?
  - *Security*—Does one alternative provide better security to prevent fraud, waste, or abuse?
- **Identify Benefits**—Every proposed IT system should have identifiable benefits for both the organization and its customers. Organizational benefits could include flexibility, organizational strategy, risk management and control, organizational changes, and staffing impacts. Customer benefits could include improvements to the current IT services and the addition of new services. Customers should help identify and determine how to measure and evaluate the benefits.
- **Establish Measurement Criteria**—Establishing measurement criteria for benefits is crucial because GPRA and the CCA emphasize tangible measures of success (benefits) related to the organization's overall mission and goals. See **Appendix G—Performance Measurement** for guidance on how to develop performance measures.
- **Classify Benefits**—Benefits that are "capable of being appraised at an actual or approximate value" are called tangible benefits. Benefits that cannot be assigned a dollar value are called intangible benefits.
- **Estimate Tangible Benefits**—The dollar value of benefits can be estimated by determining the fair market value of the benefits. An important economic principle used in estimating public benefits is the market value concept. Market value is the price that a private sector organization would pay to purchase a product or service
- **Quantify Intangible Benefits**—Intangible benefits can be quantified using a subjective, qualitative rating system. A qualitative rating system might evaluate potential benefits against the following:
  - Provides Maximum Benefits (2 points)
  - Provides Some Benefits (1 point)

- ▲ Provides No Benefits (0 points)
- ▲ Provides Some Negative Benefits (-1 point)
- ▲ Provides Maximum Negative Benefits (-2 points).

Once the rating system is selected, each benefit is evaluated for each alternative. This should be done by a group of three to five individuals familiar with the current IT system and the alternatives being evaluated. The numerical values assigned to the ratings then can be summed and averaged to obtain a score for each benefit. **Table E-5** shows the scores for benefits A to D from four reviewers using a scale of 1 to 5.

Benefit	Reviewer 1 Score	Reviewer 2 Score	Reviewer 3 Score	Reviewer 4 Score	Reviewer Average Score
A	5	4	3	5	4.25
B	4	2	3	4	3.25
C	3	2	5	4	3.50
D	4	3	2	2	2.75

Table E-5. Sample Reviewer Scores for Intangible Benefits

An option that can be used in a qualitative assessment is to "weight" each benefit criteria with regards to importance. The more important the benefit, the higher the weight. The advantage of weighting is the more important benefits have a greater influence on the benefit analysis outcome. The weighting scale can vary between any two predetermined high and low weights. An example of calculating a weighted score is provided in **Table E-6** and demonstrates using weighting factors makes Alternative 1 the clear winner.

9. Discount Costs and Benefits

After costs and benefits for each system lifecycle year have been identified, convert them to a common measurement unit by discounting future dollar values and transforming future benefits and costs to their "present value." Present values are calculated by multiplying the future value times the discount factors published in the OMB Circular A-94.

Benefit	Alternative 1 Raw Score	Alternative 2 Raw Score	Weighting Factor	Alternative 1 Weighted Score	Alternative 2 Weighted Score
A	4	2	10	40	20
B	3	2	9	27	18
C	4	3	8	32	24
D	2	3	6	12	18
E	3	4	5	15	20
TOTAL	**18**	**18**		**136**	**120**

Table E-6. Sample Weighted Benefits Score

Table E-7 shows annual costs and benefits for a system lifecycle, along with the discount factor, the discounted costs and benefits (present values), and the discounted net (NPV). The discounted costs and benefits are computed by multiplying costs and benefits by the discount factor. The net benefit without discounting is $380,000 ($3,200,000 minus $2,820,000) while the discounted (present value) net is less than $60,000 because the biggest costs are incurred in the first two years, while the benefits are not accrued until the third year. When evaluating costs and benefits, be cautious of returns that accrue late in the investment's lifecycle. Due to discounting, benefits that accrue in later years do not offset costs as much as earlier-year benefits. Also, these later-year benefits are less certain. Both the business and IT environments may experience significant changes before these later-year benefits are realized.

Year	Annual Cost (AC)	Annual Benefit (AB)	Discount Factor (DF)	Discounted Cost (DC) ACxDF	Discounted Benefit (DB) ABxDF	Discounted Net DB - DC
1	150,000		0.9667	145,010		(145,010)
2	600,000		0.9035	542,095		(542,095)
3	280,000	400,000	0.8444	236,428	337,754	101,326
4	260,000	400,000	0.7891	205,178	315,658	110,480
5	300,000	400,000	0.7375	221,256	295,007	73,752
6	300,000	400,000	0.6893	206,781	275,708	68,927
7	240,000	400,000	0.6442	154,603	257,671	103,068
8	230,000	400,000	0.6020	138,468	240,814	102,346
9	230,000	400,000	0.5626	129,409	225,060	95,650
10	230,000	400,000	0.5258	120,943	210,336	89,393
Total	2,820,000	3,200,000		2,100,171	2,158,008	57,837

Table E-7. Sample Discounted Lifecycle Costs and Benefits

10. Evaluate Alternatives

Many benefits cannot be quantified in dollar terms. As a result, evaluating alternatives cannot always be done using present values but valid evaluations can be made using a combination of dollar values and quantified relative values (values that are numeric, but do not represent dollar values).

- **Evaluate All Dollar Values**—Once all the costs and benefits for each competing alternative have been assigned dollar values and discounted, the NPV of the alternatives should be compared and ranked. When the alternative with the lowest discounted cost provides the highest discounted benefit, it is the clear winner, as shown in **Table E-8**.

Alternative	Discounted Cost (DC)	Discounted Benefit (DB)	Discounted Net (DB - DC)	Benefit-Cost Ratio (DB/DC)
1	1,800,000	2,200,000	400,000	1.22
2	1,850,000	1,750,000	(100,000)	0.95
3	2,000,000	2,000,000	0	1.00
4	2,200,000	2,100,000	(100,000)	0.95

Table E-8. Sample Investment Comparison—(Lowest Cost System Provides Highest Benefit)

- **Discounted Net**—There will probably be very few cases where the alternative with the lowest discounted cost provides the highest discounted benefit. The next number to consider is the Discounted Net (Discounted Benefit minus Discounted Cost). If one alternative clearly has the highest Discounted Net, it is considered the best alternative; however, it is usually advisable to look at other factors.
- **Benefit-Cost Ratio**—When the alternative with the highest discounted net is not a clear winner, the benefit-cost ratio or BCR (discounted benefit divided by discounted cost) may be used to differentiate between alternatives with very similar or equal Discounted Nets. In **Table E-9**, Alternative 4 would be the winner because it has a higher BCR than Alternative 5. Alternatives 4 and 5 are clearly superior to other alternatives because they have the highest discounted net.
- **Evaluate With Intangible Benefits**—When all the benefits are intangible, evaluation will be based on quantifying relative benefits.

Alternative	Discounted Cost (DC)	Discounted Benefit (DB)	Discounted Net (DB-DC)	Benefit-Cost Ratio (DB/DC)
1	1,500,000	1,600,000	100,000	1.07
2	1,600,000	1,750,000	150,000	1.09
3	1,900,000	2,000,000	100,000	1.05
4	2,000,000	2,450,000	450,000	1.23
5	3,000,000	3,450,000	450,000	1.15

Table E-9. Sample Investment Comparison—(Other Than Lowest Cost System Provides Highest Benefit)

11. Perform Sensitivity Analysis

Sensitivity analysis tests the sensitivity of input parameters and the reliability of the CBA result. Sensitivity analysis should assure reviewers the CBA provides a sound basis for decisions. The sensitivity analysis process requires the following:

- **Identify Input Parameters**—The assumptions documented earlier in the CBA are used to identify the model inputs to test for sensitivity. Good inputs to test are those that have significant (large) cost factors and a wide range of maximum and minimum estimated values. Some common parameters include:
  - System requirement definition costs
  - System development costs
  - System operation costs
  - Transition costs, especially software conversion
  - System lifecycle
  - Peak system demands.
- **Repeat the Cost Analysis**—For each parameter identified, determine the minimum and maximum values. Then, choose either the minimum or maximum value as the new parameter value (the number selected should be the one that most differs from the value used in the original analysis). Repeat the CBA with the new parameter value and document the results. Prepare a table like in **Table E-10** to summarize the different outcomes and enable the results to be quickly evaluated.

Parameter	Parameter Value	Best Alternative
Development Cost ($)	1,500,000 2,000,000 2,500,000	A A B
Transition Costs ($)	100,000 200,000	A A
System Lifecycle (Years)	5 10 15	A B C
Benefits ($)	1,500,000 2,250,000 3,000,000	A A B

Table E-10. Sample Sensitivity Analysis

- **Evaluate Results**—Compare the original set of inputs and the resulting outcomes to the outcomes obtained by varying the input parameters. In the previous table, the original values are the first value listed for each parameter. Sensitivity is measured by how much change in a parameter is required to change the alternative selected in the original analysis. The sensitivity guidelines include the following:
  - A parameter is not considered sensitive if it requires a decrease of 50 percent or an increase of 100 percent to cause a change in the selected alternative.

- ▲ A parameter is considered sensitive if a change between 10 percent and 50 percent causes a change in the selected alternative.
- ▲ A parameter is considered very sensitive if a change of 10 percent or less causes a change in the selected alternative.

In the previous example, the analysis would appear to be somewhat sensitive to the development costs, but not sensitive to the transition costs and benefits

12. Comparing Investments

Even if the CBA shows that benefits will outweigh costs, using Payback Period and Return on Investment (ROI) analysis help demonstrate an investment is a better utilization of funds than other proposed investments.

- **Payback Period—Table E-11** illustrates that the money invested in the system's development, installation, and operation is not offset by the benefits until the tenth year. In other words, the payback period for the system is ten years, which is generally unacceptable, making it difficult for this investment to obtain funding.

Year	Annual Cost (AC)	Annual Benefit (AB)	Discount Factor (DF)	Discounted Cost (DC) ACxDF	Discounted Benefit (DB) ABxDF	Discounted Net DB - DC	Cumulative Discounted Net
1	150,000		0.9667	145,010	0	(145,010)	(145,010)
2	600,000		0.9035	542,095	0	(542,095)	(687,106)
3	280,000	400,000	0.8444	236,428	337,754	101,326	(585,779)
4	260,000	400,000	0.7891	205,178	315,658	110,480	(475,299)
5	300,000	400,000	0.7375	221,256	295,007	73,752	(401,547)
6	300,000	400,000	0.6893	206,781	275,708	68,927	(332,620)
7	240,000	400,000	0.6442	154,603	257,671	103,068	(229,552)
8	230,000	400,000	0.6020	138,468	240,814	102,346	(127,206)
9	230,000	400,000	0.5626	129,409	225,060	95,650	(31,556)
10	230,000	400,000	0.5258	120,943	210,336	89,393	57,837
Total	**2,820,000**	**3,200,000**		**2,100,171**	**2,158,008**	**57,837**	

Table E-11. Sample Payback Period

- **Return on Investment**—ROI is often used when comparing proposed investments. Total Discounted Net (Total Discounted Benefits minus the Total Discounted Costs) is often referred to as the return or profit from an investment. ROI is calculated by dividing the Total Discounted Net by the Total Discounted Cost. In the table above, ROI is the Total Discounted Net ($57,837) divided by Total Discounted Costs ($2,100,171) and equals 0.0275. Since ROI is often cited as a percentage, multiplying by 100 converts the decimal rate to 2.75.

The ROI is really just another way to express the BCR. In the example above, the BCR is the Total Discounted Benefit ($2,158,008) divided by the Total Discounted Costs ($2,100,171) and equals 1.0275. The 1.0275 can also be expressed as 102.75 percent. This means that the benefits are 2.75 percent greater than the costs. Compute the ROI by subtracting 1 from the BCR.

The ROI must also be adjusted for risk. To adjust ROI for risk, use the process described for calculating the "risk factor" described in Appendix F.2. The "risk factor" for all risks should be totaled and added to the investment cost. Adjusting the ROI for risk will aid in comparing alternatives with different potential risk levels and will help ensure that returns for investments with higher risk potential are fully understood. (See **Appendix F—Risk Assessment** for a more detailed discussion on risk analysis.)

APPENDIX F—RISK ASSESSMENT

F.1 PURPOSE

Risk is part of any capital investment. Identifying and controlling risks during the Select Phase can have a significant impact on the investment's overall success. However, risk is not the only consideration for investment evaluations. Investments with high technical risk may be selected if the investment is deemed a strategic or operational necessity. Other investments may be selected simply because they have low risk and require few resources. Conducting a risk assessment and controlling risk is a continuing process throughout the investment lifecycle.

F.2 PROCESS

The risk evaluation process is composed of three steps:

1. Identify risks
2. Analyze risks
3. Control risks.

Each of these steps is detailed in the following sections.

1. Identify Risks

Risk identification consists of determining and documenting risks that will likely have an impact on the investment. The identification and associated analysis is a continuing process that should be done periodically throughout the investment lifecycle. Both internal and external risks should be identified. Internal risks are those that can be directly controlled within the project. There are several mechanisms available to assist in identifying risk areas that include historical information, work breakdown structure (WBS), project plans, risk checklist, and interviews. The following risk taxonomy or checklist is provided to assist in the risk identification. The Project Manager analyzes the following areas to identify investment risks.

- **Financial Risk**—Risks that could result in needing unexpected funding, such as scope creep, sponsorship changes, cost overruns, legal dispute outlays, costs of lost information/data, hardware/software failure and replacement, costs to correct design errors or omissions, and potential cost of relying on a single vendor.
- **Technical Risk**—Risks caused by an inability to accurately predict the investment's lifecycle. This can result from a failure to attain expected benefits from the investment, inaccurate investment cost or duration estimates, failure to achieve adequate system performance levels, failure to adequately integrate a new system with existing hardware and software, or failure to integrate organizational procedures or processes. Technical risk can be determined by the following factors:
  - Investment Size:
    - Number of project team members
    - Project duration
    - Number of organizational departments involved in the investment
    - Size of programming effort (e.g., hours).
  - Investment Structure:
    - Complexity of effort (e.g., number of interfaces with other systems, etc.)
    - Security vulnerabilities
    - New system or renovation of existing system(s)
    - Organizational, procedural, or personnel changes resulting from the system
    - User perceptions and willingness to participate
    - Management commitment
    - Level of user involvement.
  - Project team's familiarity with:
    - Proposed business or application area
    - Target development environment, tools, and operating system
    - Development of similar systems.
  - User group's familiarity with:
    - System development process
    - Proposed application or business area
    - Similar investments
    - New technology.
- **Operational Risk**—The degree to which a proposed investment solves business problems or takes advantage of business opportu-

nities. The business case may be enhanced if the investment can be linked to the overall strategic plan. Information should be included on how the investment will affect organizational structures and procedures. (Investments with broader impacts on existing organizational structures or procedures are more risky than investments with lesser or more narrow impacts.)

- **Schedule Risk**—The degree to which the expected completion dates for all major investment activities meet organizational deadlines and constraints for effecting change. Concerns may include governmental regulation deadlines, project management experience, schedule timeframe, resource availability and competency, and contractor capabilities.
- **Legal and Contractual Risks**—The investment ramifications that could result from developing an information system. Risks increase when outside organizations are involved. Risks may include, but are not limited to:
  - Contract protests
  - Copyright infringements
  - Non-disclosure
  - Labor laws
  - Foreign trade regulations (limiting encryption techniques)
  - Financial reporting standards
  - Software ownership in joint ventures
  - License agreements.
- **Organizational Risk**—Risks associated with key stakeholders and their view of the investment. Redistribution of power is the single greatest element that will increase organizational risk. Increasing stakeholder buy-in lowers organizational resistance to change.

2. Analyze Risks

Each risk is analyzed based on an assessment of likelihood and impact. There are numerous activities used to analyze risks in order to obtain a complete assessment of risks to aid in developing risk management and control strategies. The following provides a summary of activities to assist in risk analysis:

- Group similar and related risks into categories. This will assist in identifying related risks as well as identifying potential dependencies between risks.
- Determine risk drivers or variables that affect the probability and impact of identified risks.
- Determine the root cause or source of risk.
- Use risk analysis techniques and tools such as simulation or decision trees to assess tradeoffs, interdependencies, and timing of identified risks.
- Estimate risk factor or risk exposure. Multiply probability of occurrence or likelihood with the consequence or impact (in dollar terms) if the risk occurred.
- Determine risk severity. Risk severity is determined by assessing the risk factor with the relative risk timeframe for action. This provides a means to assist in prioritizing risks to better focus control strategies.
- Rank and prioritize risks.

In addition to prioritized risks, a primary output of the risk analysis is an overall “risk factor” that can be applied to each risk. To calculate the risk factor, determine the impact a particular risk (in dollar terms) will have on the investment if it is realized, and the likelihood (probability in percentage terms) of this risk occurring. Then multiply these two numbers together. Calculate the risk factor for each identified investment risk and sum the risk factors to determine an overall risk rating for the investment. The overall risk rating should reflect the risk-adjusted ROI for the investment (see “Appendix E: Cost-Benefit Analysis” for a discussion on ROI and risk adjustment.)

To aid comparisons across investments, it is useful to also calculate a risk score. This is computed by dividing the investment’s overall risk rating by the number of identified risks. This encourages Project Managers to include all identified risks and provides a more accurate picture of the overall investment risk. For example, several low-impact, low-likelihood risks may be less risky than a single high-impact, high-likelihood risk.

The Risk Assessment Plan, submitted as part of the Select and Control Phases should, at a minimum, have the columns shown in **Figure F-1**.

Risk Priority	Risk Description	Probability of Risk Occurring (in %)	Cost if Risk Occurred	Risk Factor

Figure F-1. Example of Risk Assessment Table

3. Control Risks

The Project Manager establishes and executes a risk management plan to mitigate risks. The development of a risk management plan assists in addressing each risk and whether to accept, avoid, transfer, or reduce the impact of the risk. This includes determining risk controls based upon available resources and identifying responsible parties. Plans should include the identification of the appropriate risk control strategy, objectives, alternatives, mitigation approach, responsible parties, resources required, activities, actions taken to date, and results achieved. The risk management plan is an evolving strategy to assist the Project Manager and ensure a higher probability of success for the investment. The plan should be updated continually as risks change throughout the lifecycle. Risks, actions taken, and results should be tracked and included as part of periodic reviews.

Risks can rarely be completely eliminated, however they can be controlled. If the following controls or risk mitigation strategies are in place, the likelihood of risk decreases and the investment is more attractive:

- Financial Controls:
  - Perform Cost-Benefit and economic analyses
  - Implement a rigorous investment management program
  - Utilize earned value, share in savings, use contracting approaches, etc. to help control costs
  - Purchase liability insurance
  - Establish clear benefits to be realized
  - Use competitive bidding for each investment design increment.
- Technical Controls:
  - Reengineer the process first
  - Use development lifecycle methodology/ structure
  - Use project planning/management software
  - Use appropriately trained personnel
  - Divide the investment into increments
  - Isolate custom design portions of the investment
  - Assign a Project Manager (preferably with Project Management Institute or similar organization certification) to be accountable for the investment
  - Conduct an IV&V
  - Conduct pilot test(s).
- Operational Controls:
  - Use a strategic information management framework
  - Establish clear requirements and objectives
  - Use a change management program to minimize organizational disruption
  - Adequately train organization and provide follow on support
  - Establish performance metrics and monitor metrics using a reporting system
  - Establish a communications plan.
- Schedule Controls:
  - Use contractual incentives for quality or timeliness
  - Use contractual penalties for missed deadlines
  - Use contractual incentives for meeting or beating deadlines
  - Use project management software
  - Use an experienced/certified Project Manager and/or provide the necessary training to the Project Manager
  - Set realistic expectations and manage those expectations
  - Use outsourcing to augment scarce internal resources.

- Legal and Contractual Controls:
  - Create a software license management program
  - Review all applicable laws
  - Apprise contracting personnel of potential legal concerns and contract disputes
  - Maintain communication with contractors to minimize contract disputes,
  - Provide multiple termination opportunities within a contract.
- Organizational Controls:
  - Obtain “buy-in” from top management early in planning stages
  - Work closely with end-users to establish system requirements
  - Maintain good communication with all stakeholders.

APPENDIX G—PERFORMANCE MEASUREMENT

G.1 PURPOSE

Performance measurement is the process whereby an organization establishes the parameters within which programs, investments, and acquisitions are reaching the desired results in support of mission goals. Performance measures are set during the Select Phase and assessed during subsequent phases. The focus of performance measurement is on outcomes, or how well the IT investment enables the program or agency to accomplish its primary mission. Consequently, performance measurement should look beyond measures of input (resource consumption), activities (milestones), and output (production numbers), which are more directly related to operational performance. This focus, however, does not imply that input, activity, and output measures are not useful. Indeed, internal measures are used to track resources and activities and make necessary adjustments since investments are only successful if hardware, software, and capabilities are delivered on time and meet specifications.

Performance is evaluated using two criteria—effectiveness and efficiency. Effectiveness demonstrates that an organization is doing the correct things, while efficiency demonstrates that an organization is doing things optimally. New acquisitions and upgrades should include a business case indicating the investment will result in effectiveness or efficiency improvements. For example, a new computer network might result in enhanced efficiency because work is processed faster, digital images are transferred among remote sites, or messages are transmitted more securely. Some questions that facilitate performance measure development include:

- What product will be produced, shared, or exchanged?
- Who will use the results?
- What decisions or actions will result from delivery of products from this system?

Answers to these questions will help Project Managers develop effective performance measures with the following characteristics:

- Strategically relevant:
  - Directed to factors that matter and make a difference
  - Promote continuous and perpetual improvement
  - Focus on the customer
  - Agreed to by stakeholders.
- Short, clear, and understandable:
  - Measurable/quantifiable
  - Meaningful.
- Realistic, appropriate to the organizational level, and capable of being measured.
- Valid:
  - Link to activity and provide a clear relationship between cause and effect
  - Focus on managing resources and inputs, not simply costs
  - Discarded when utility is lost or when new, more relevant measures are discovered.

G.2 PROCESS

Outcome-based performance measures are developed through a series of steps. It is important to understand that developing measures is only one part of the more comprehensive process. After measures are developed, baseline information is gathered if it does not already exist, and performance information is collected, analyzed, interpreted, and used throughout the investment's life. These steps require a commitment of management attention and resources.

The following five steps are recommended to establish performance measures:

1. Analyze how the investment supports the mission goals and objectives and reduces performance gaps
2. Develop performance objectives and measures that characterize success
3. Validate the objectives and measures with senior Program Managers
4. Develop collection plan and collect data
5. Evaluate, interpret, and report results
6. Review process to ensure it is relevant and useful.

Steps one to three are completed during the Pre-Select and Select Phases. Steps four and five are completed during the Control Phase, with follow-up during the Evaluate and Steady-State Phases. Each of these process steps is defined in the following sections.

1. Analyze how the Investment Supports the Mission and Reduces Performance Gaps

Effective outcome-based performance measures are derived from the relationship between the new investment and how users will apply investment outputs. Specifically, the users' mission and critical success factors (those activities and outputs that must be accomplished if users are to achieve their mission) must be clearly understood. The critical element of this step is linking proposed and in-process IT investments and activities to the user mission and critical success factors.

This concept is often described as a method of strategically aligning programs and support functions with the agency's mission and strategic priorities. The first step in effectively developing outcome-based IT performance measures is to identify the organization's mission, the critical tasks necessary to achieve the mission, and the strategies that will be implemented in order to complete those tasks. One structured method of accomplishing this step is to develop a Logic Model linking the mission to IT performance measures. An example of a Logic Model is provided in **Figure G-1**.

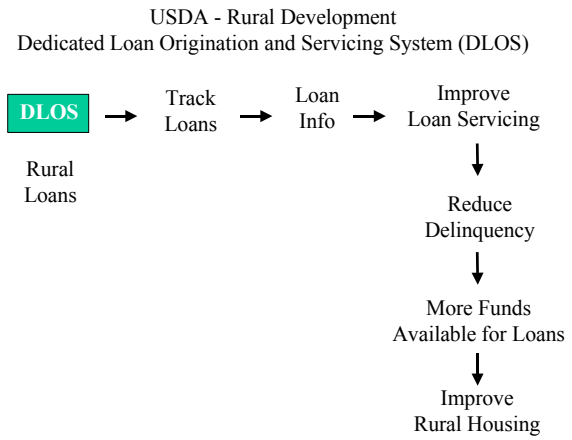


Figure G-1. Example of Logic Model[3]

Answers to the following questions will aid logic model development:

- Identify the system or the left most box. What will the system do? What are major functions or features that the system will provide, i.e., what functionality or information? Is this system a standalone system or is it used or integrated with another large system? What is the purpose of that system? How is it used?
- What aspects of the system, service, and information quality are needed for the system to perform optimally or acceptably?
- Identify who will use the system. What is the principal business task they perform? How will using the system help them with their task?
- How does completion of that task contribute to a business function?
- How does completion of the business function contribute to achievement of the program goals?
- How does completion of program goals contribute to organizational goals?
- How does completion of organizational goals contribute to Departmental goals?
- Determine whether there are related IT investments that impact the mission area and goal(s) selected. Understand the relationships between various IT investments that address the same or similar needs. This will help identify potential areas for consolidation.

Once the mission is clearly defined, a gap analysis is performed to understand how IT can improve mission performance. The analysis begins with the premise that IT will improve effectiveness, efficiency, or both. In order to accomplish this, requirements are defined and the following questions are answered:

- Why is this application needed?
- How will the added functionality help users accomplish the mission?
- How will the added functionality improve day-to-day operations and resource use?

The investment initiation and requirement documentation also describes gaps between the current and future mission and strategy in terms of how overall efficiency and effectiveness will be improved. Project managers assist users in devel-

3 DLOS model from the Rural Development's Rural Housing Service.

oping a baseline measurement of the current IT utilization and in comparing the baseline to the business objective in order to identify gaps. This analysis defines the investment need as the basis for determining what success will look like (e.g., the investment is successful when the gap is reduced by "x" amount).

2. Develop IT Performance Measures that Characterize Success

Well-designed performance measures define success parameters for the IT initiative. The following questions should be asked for each performance measure and answered affirmatively before deploying the measure:

- Is it useful for monitoring progress and evaluating the degree of success?
- Is it focused on outcomes that stakeholders will clearly understand and appreciate?
- Is it practical? Does it help build a reliable baseline and cost-effectively collect performance data at periodic intervals?
- Can the performance measure be used to determine the level of investment risk and whether the investment will meet performance targets?

Answering these questions affirmatively results in an agreement that the IT investment, by supporting improvements identified earlier, will support organizational goals and objectives. Additionally, it will help limit the number of performance measures and focus management attention on the requirements that have the greatest priority or impact. After three to five major requirements have been identified, the following questions are asked:

- What are the performance indicators for each major requirement?
- How well will those outputs satisfy the major requirements?
- What additional steps must be taken to ensure outputs produce intended outcomes?
- How does this IT investment improve capabilities over the current method?

Once requirements to be measured are identified, determine when each requirement is met. Some requirements may need to be changed if they are too difficult to measure. Or, if the requirement has indirect rather than direct outcomes, it may be necessary to use "surrogate" performance measures that mirror actual outcomes. For example, it is difficult to measure the direct benefit of computer-based training (CBT) systems. In this case, a surrogate measure might be the percentage of staff achieving certifications through the CBT with implications that certified staff are more desirable than non-certified staff because they have demonstrated initiative and are more proficient.

Of the possible performance indicators, select one or more to report performance against each requirement. One performance indicator may provide information about more than one requirement. The objective is to select the fewest number of performance indicators that will provide adequate and complete information about progress.

Selecting the fewest performance indicators necessary is important because data collection and analysis can be costly. The cost is acceptable if the benefit of the information received is greater than the cost of performance measurement, and if the data collection does not hinder accomplishment of primary missions. Costs are calculated by adding the dollars and staff time and effort required to collect and analyze data. When calculating costs, consider whether they are largely confined to initial or up-front costs, or will occur throughout the IT lifecycle. For example, the cost of developing and populating a database may have a large initial cost impact, but diminish significantly for later maintenance. Answers to the following questions will help to determine the cost of tracking a specific performance indicator:

- What data are required to calculate the performance measure?
- Who collects the data and when?
- What is the verification and validation strategy for the data collection?
- What is the method to ensure the quality of the information reported?

In addition to determining costs, it is also necessary to determine the baseline performance, target performance, and expected time to reach the target. The baseline value is the start point for future change. If there are performance measures currently in use, the data collected can provide the baseline. Otherwise the manager will have to de-

termine the baseline by a reasonable analysis method including the following:

- Benchmarks from other agencies and private organizations
- Initial requirements
- Internal historical data from existing systems
- Imposed standards and requirements.

To determine the target value, obtain stakeholder agreement regarding the quantifiable benefits of the new system. These targets may be plotted as a function over time, especially for IT investments that are being installed or upgraded or as environmental factors change. However, incremental improvement is not necessarily success. The targeted improvement from the baseline must be achieved within the designated timeframe in order to be counted as a success.

3. Develop Collection Plan and Collect Data

In order to ensure performance data is collected in a consistent, efficient, and effective manner, it is useful to develop and publish a collection plan so all participants know their responsibilities and can see their contributions. The collection plan details the following items:

- Activities to be performed
- Resources to be consumed
- Target completion and report presentation dates
- Decision authorities
- Individuals responsible for data collection.

In addition, the collection plan answers the following questions for each performance measure:

- How is the measurement taken?
- What constraints apply?
- Who will measure the performance?
- When and how often are the measurements taken?
- Where are the results sent and stored, and who maintains results?
- What is the cost of data collection?

While costs should have been considered during the previous step, the actual cost will be more evident at this stage. Excessively costly performance measures may require project managers to find a different, less costly mix of performance measures for the IT investment. Or it may be necessary to creatively collect the measures in order to reduce collection cost. For example, a sampling may produce sufficiently accurate results at significantly less cost than counting every occurrence, and some results can be automatically generated by the system and accessed through a standard report.

To ensure data is being collected in a cost-effective and efficient manner, it is important to ensure the data collectors are involved in developing performance measures. The collectors will do a much better job if they believe the performance measures are valid and useful, and they will have insight regarding the best way to collect the data.

4. Evaluate, Interpret, and Report Results

Performance measures are useful in monitoring the investment against expected benefits and costs. To evaluate performance, data is compiled and reported according to the collection plan that was previously constructed. The data is then evaluated and the following questions are answered regarding the collected data and the investment's performance:

- Did the investment exceed or fall short of expectations? By how much and why?
- If the data indicates targets are successfully reached or exceeded, does that match other situational perceptions?
- What were the unexpected benefits or negative impacts to the mission?
- What adjustments can and should be made to the measures, data, or baseline?
- What actions or changes would improve performance?

This evaluation reveals any needed adjustments to the IT investment or performance measures. It also helps surface any lessons learned that could be fed back to the investment management process.

5. Review Process to Ensure it is Relevant and Useful

Performance measures provide feedback to managers and help them make informed decisions on future actions. To ensure that performance measures are still relevant and useful, answer the following questions:

- Are the measures still valid?
  - Have higher-level mission or IT investment goals, objectives, and critical success factors changed?
  - Are threshold and target levels appropriate in light of recent performance and changes in technology and requirements?
  - Can success be defined by these performance measures?
  - Can improvements in mission or operations efficiency be defined by the measures?
  - Have more relevant measures been discovered?
- Are the measures addressing the right things?
  - Are improvements in performance of mission, goals, and objectives addressed?
  - Are all objectives covered by at least one measure?
  - Do the measures address value-added contributions made by overall investment in IT and/or individual programs or applications?
  - Do the measures capture non-IT benefits and customer requirements?
  - Are costs, benefits, savings, risks, or ROI addressed?
  - Do the measures emphasize the critical aspects of the business?
- Are the measures the right one to use?
  - Are measures targeted to a clear outcome (results rather than inputs or outputs)?
  - Are measures linked to a specific and critical organizational process?
  - Are measures understood at all levels that have to evaluate and use them?
  - Do the measures support effective management decisions and communicate achievements to internal and external stakeholders?
  - Are the measures consistent with individual motivations?
  - Are measures accurate, reliable, valid, and verifiable?
  - Are measures built on data that are available at reasonable costs and in an appropriate and timely manner for the purpose?
  - Are measures able to show interim progress?
- Are measures used in the right way?
  - Are measures used in strategic planning (e.g., to identify baselines, gaps, goals, and strategic priorities) or to guide prioritization of program initiatives?
  - Are measures used in resource allocation decisions and task, dollars, and personnel management?
  - Are measures used to communicate results to stakeholders?

APPENDIX H—PROJECT MANAGEMENT

H.1 PURPOSE

Project Management is a crucial element for IT investment success. It involves executing the necessary skills and management practices to ensure successful investment development and implementation. This integrated skill set addresses such areas as project planning, scope management, cost, schedule, performance, risk, and organizational management. The Project Manager is ultimately responsible for the investment's success and ensuring the investment delivers the functionality and capabilities expected by stakeholders (i.e., users, customers, and senior leaders). Perhaps the greatest project management challenge is identifying risks, and executing management techniques that mitigate the risks to ensure timely and successful completion.

H.2 COMPONENTS

Project Managers should complete the following project management components to help ensure the investment's successful completion:

- **Project Planning**—Project planning is a critical element of every successful investment. It provides a foundation on which to base anticipated efforts. Additionally, it helps identify investment components and illustrates these components in a project plan. Project planning includes:
  - Scope definition
  - Activity identification
  - Activity duration estimation
  - Activity sequencing
  - Cost estimation
  - Schedule development
  - Project staffing/resourcing
  - Project plan development.

Investments typically involve multiple components that may be complex or interface with other proposed/existing systems or data. Integrating these components can be challenging. To support improved integration and management, it is useful to develop a Work Breakdown Structure (WBS). A WBS provides a management framework by separating the investment lifecycle into distinct, manageable components related to various activities and interfaces. Each component is defined with appropriate sub-components and activities, such that one individual or team can implement each component. This enables the Project Manager to more effectively estimate the cost and schedule for completing individual components, supports sequencing activities and identifying interdependencies, and provides a basis to identify milestones and develop resource and schedule estimates. **Figure H-1** provides an example of a WBS.

- **Scope Management**—The scope frames what is expected of the investment's ultimate capability and functionality. As such, it directly impacts functional and system requirements development. The Project Manager should obtain the Project Sponsor's concurrence on the investment's scope, and then effectively manage that scope and mitigate "scope creep" by using requirements and configuration management procedures. The initial scope should be based on the mission need identified during the Pre-Select Phase and documented as part of the Mission Needs Statement (see "Appendix C: Mission Needs Statement").
- **Risk**—Risk is inherent in every investment. To aid in effectively identifying, analyzing, and managing risk, Project Managers should develop a risk management plan early in the planning stages, ideally during the Select Phase. Key risk areas may include technology, cost, schedule, and performance/quality. The risk management plan is continually updated throughout the investment's lifecycle and is part of annual and periodic reviews. ("Appendix F: Risk Assessment" provides additional guidance on risk assessment and management.)
- **Cost and schedule management**—Effective investment management entails establishing cost and schedule baselines. Actual information is continuously collected, analyzed, and compared to original projections and the current baseline. Variances are identified and appropriate actions are taken to inform senior management and mitigate the impacts of increased costs and schedule slippages. The WBS, milestones, activities, and project plan assist the development and tracking of cost and schedule. The use of earned value techniques provides a means to more completely evaluate costs and schedule, and assists in early risk identification (see **Appendix I—Earned Value Analysis**).

Plan Project	
100	**Define Project**
10	Determine Project Objectives
20	Define Project Scope
30	List Project Products
40	Determine Project Constraints
50	Select Project Approach
60	Determine Project Standards
70	Assess Project Risks
200	**Make Project Plan**
10	Define Work Breakdown Structure
20	Determine Activity Dependencies
30	Define Project Milestones
40	Determine Project Organization
50	Estimate Effort
60	Allocate Resources
70	Schedule Activities
80	Develop Budget
90	Assess Project Risks
300	**Obtain Project Approval**
10	Assemble Project Plan
20	Present Project Plan
30	Agree to Project Plan
MPMP1	Milestone PMP1

Figure H-1. Example of a Project Planning WBS

- **Performance**—An investment's ultimate objective is to meet or exceed stakeholder performance expectations by ensuring the investment satisfies the mission need and business requirements. In the Pre-Select and Select Phases, performance planning includes defining performance measures and identifying activities required to ensure performance objectives will be met (see **Appendix G—Performance Measurement**). This may include benchmarking to establish a baseline and to further refine the investment's performance objectives. The Control Phase includes a continual monitoring of the performance baseline to potentially include quality reviews, tests, or pilot tests. In the Evaluate Phase, a PIR helps compare actual investment performance with expectations (see "Appendix J: Post-Implementation Reviews"). During the Steady-State Phase, performance measures are analyzed to determine whether investments are continuing to meet mission needs and performance expectations.
- **Organizational Management**—Organizational management skills needed to manage an investment include project staffing, communications, and organizational understanding. Project Managers should be able to identify the needed skill sets and assign appropriate personnel to accomplish a given set of activities. Project Managers should also have the requisite interpersonal and leadership skills to communicate with both the project team and stakeholders. This includes possessing a vision for the investment and how to best meet stakeholder expectations, as well as ensuring the project team is able to focus on assigned tasks/activities. Additionally, Project Managers should be able to communicate and build consensus with key stakeholders since this ultimately impacts the investment's success or failure.

APPENDIX I—EARNED VALUE ANALYSIS

I.1 PURPOSE

Earned value analysis is a program management technique that uses an investment's past performance and work as indicators of the investment's future. This enables the Project Manager to evaluate and gain insight into an investment's actual schedule and financial progress relative to the project plan. Earned value analysis identifies expenditure and scheduling projections for established critical path milestones, or significant points in the investment's development where the initiation of each milestone is dependent on the completion of a prior milestone. The Project Manager tracks actual progress and expenditures at the completion of each critical path milestone against planned figures to obtain variances. These variances can then be used to identify schedule and cost overruns so they can be resolved as quickly as possible.

The earned value methodology requires an investment to be fully defined at the outset. The information that is required to complete an earned value analysis includes:

- List of all critical path milestones
- Budgeted percentage of work performed for each critical path milestone
- Planned critical path milestone start and completion dates
- Planned expenditures for each critical path milestone
- Total investment budget
- Budgeted dollars for work performed for each critical path milestone
- Planned investment start and end dates.

The approach can provide accurate and reliable assessments from as early as 15 percent into the investment's life. It provides early indications of cost and schedule variances in order to take appropriate risk mitigation steps. Typically, investments that are over budget when 15 percent of the investment is finished will result in cost overruns. Once a cost overrun is identified, it can generally only be reduced by 10 percent, which indicates the need to support early awareness of potential cost and schedule risks. Early investment assessment and identification of cost and schedule variances is critical for the overall success of the investment, and supports improved cost and schedule control.

I.2 PROCESS

Before completing earned value analysis, the Project Manager needs to complete the following project management tasks (see "Appendix H: Project Management"):

- Develop a WBS
- Define investment activities
- Allocate costs to each WBS element
- Schedule each activity
- Chart and evaluate the investment's status.

The Project Manager will then have the basis for periodically assessing the investment's performance and completing the following four steps in the earned value analysis process:

1. Update the Schedule

The scheduled activities are reported as started, completed, or with a remaining duration as appropriate. The percent complete of unfinished activities are also reported. For work that results in discrete/concrete deliverable products (e.g., reports, studies, briefings, etc.), it generally is easy to determine the percent complete. For efforts that are not so easily measured, special "earning rules" may be employed. A common "earning rule" is to report percent complete according to completed milestones within an activity.

2. Record Actual Costs

After updating the schedule, actual costs from the investment's accounting system are recorded. In situations where the accounting system does not provide the level of detail required to obtain actual accounting costs, the Project Manager may need to use a best guess or judgment to determine what percentage of actual costs should be assigned to the investment.

3. Calculate Earned Value Measures

After recording actual costs for the reporting period, earned value measures are calculated and reports generated. This can be done, in part, by creating an earned value chart as shown in **Figure I-1.** (This can be accomplished using a standard project management or spreadsheet software's charting functionality.)

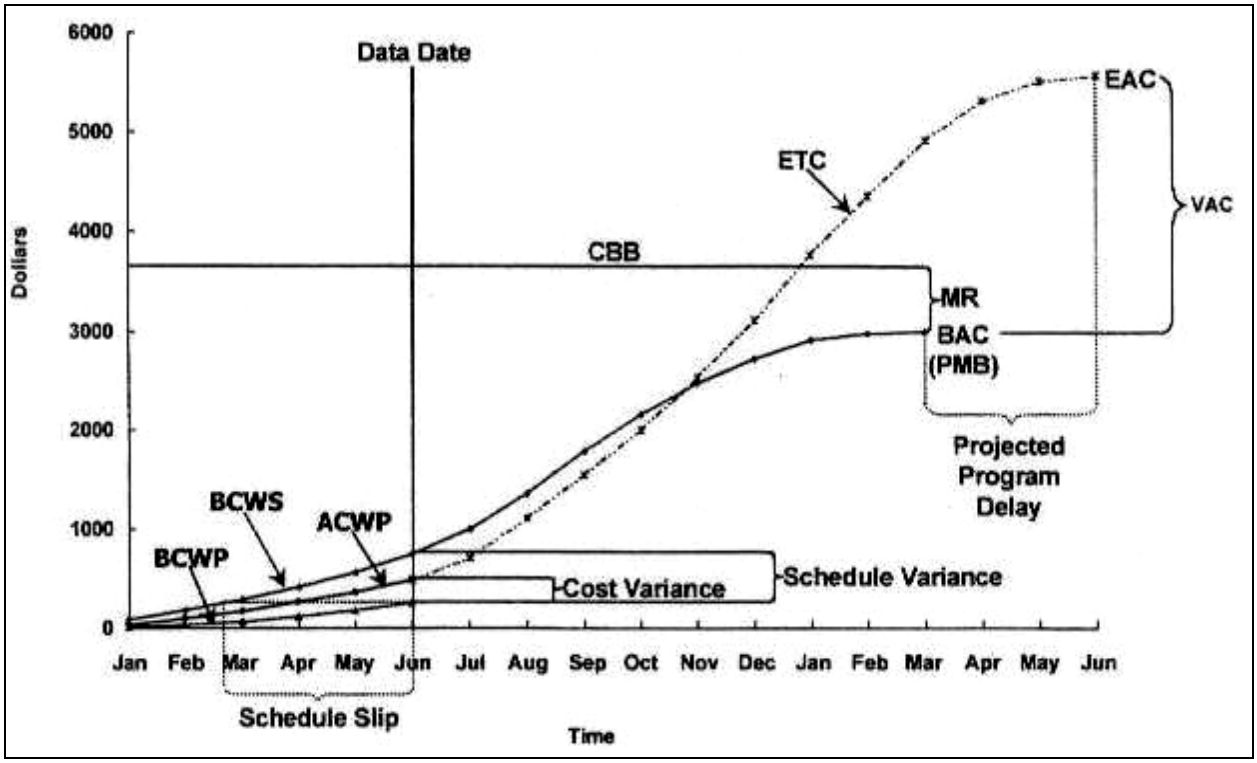


Figure I-1. Sample Earned Value Analysis Chart

The sample chart includes the following earned value measures:

- **Actual Cost of Work Performed (ACWP)**—The costs actually incurred and recorded in accomplishing the work performed within a given time period.
- **Budget at Completion (BAC)**—The sum of all budgets established for the contract.
- **Budgeted Cost for Work Performed (BCWP)**—The sum of the budgets for completed work packages and completed portions of open work packages, plus the applicable portion of the budgets for level of effort and apportioned effort.
- **Budgeted Cost of Work Scheduled (BCWS)**—The sum of all WBS element budgets that are planned or scheduled for completion.
- **Contract Budget Base (CBB)**—The total cost of all budgeted activities necessary to complete a task.
- **Cost Performance Index (CPI)**—Earned Value divided by the actual cost (BCWP divided by ACWP).
- **Cost Variance (CV)**—Earned Value minus the actual cost (BCWP minus ACWP).
- **Estimate at Completion (EAC)**—The actual costs incurred, plus the estimated costs for completing the remaining work.
- **Estimate to Complete (ETC)**—The cost necessary to complete all tasks from the ACWP end date through the investment's conclusion.
- **Management Reserve (MR)**—The amount of the total allocated budget withheld for management control purposes rather than designated for the accomplishment of a specific task or set of tasks; not part of the performance measurement.
- **Performance Measurement Baseline (PMB)**—The time-phased budget plan against which investment performance is measured.
- **Schedule Variance (SV)**—Earned Value minus the planned budget for the completed work (BCWP minus BCWS).
- **Variance at Completion (VAC)**—The difference between the total budget assigned to a contract, WBS element, organizational entity, or cost account and the estimate at comple-

tion; represents the amount of expected overrun or underrun.

4. Analyze the Data and Report Results

The critical path milestones used to complete the earned value analysis are directly derived from the project plan. These are the milestones that require completion before a successive milestone can begin. The data is collected and monitored for each milestone throughout the project to achieve maximum effectiveness.

APPENDIX J—POST-IMPLEMENTATION REVIEWS

J.1 PURPOSE

PIRs support the Evaluation Phase of the process (see Chapter 5). PIRs help determine whether investments have achieved expected benefits such as lowered cost, reduced cycle time, increased quality, or increased speed of service delivery.

The PIR has a dual focus:

1. It provides an assessment of the implemented investment, including an evaluation of the development process, and
2. It indicates the extent to which the USDA's decision-making processes are sustaining or improving the success rate of IT investments.

The PIR usually occurs either after a system has been in operation for about six months or immediately following investment termination.

A team of agency and/or staff office personnel should conduct the PIR. However, in order to ensure the review is conducted independently and objectively, the PIR team should not include members from the investment under review. The PIR team should review the following investment elements:

- Mission alignment
- IT architecture and telecommunications infrastructure (including security and internal controls)
- Performance measures
- Project management
- Customer acceptance
- Business process support
- High performance workforce
- Cost versus anticipated savings.

As a minimum, the PIR team will evaluate customer/user satisfaction with the end product, mission/program impact, and technical capability, as well as provide decision-makers with lessons learned so they can improve investment decision-making processes.

The review will provide a baseline to decide whether to continue the system without adjustment, to modify the system to improve performance or, if necessary, to consider alternatives to the implemented system. Even with the best system development process, it is quite possible that a new system will have problems or even major flaws that must be rectified in order to obtain full investment benefits. The PIR should provide decision-makers with useful information on how best to modify a system, or to work around the flaws in a system, in order to improve performance and bring the system further in alignment with the identified business needs.

J.2 PROCESS

As detailed below, there are seven major steps to conducting a PIR:

1. Initiate PIR

The review team initiates a PIR by preparing and sending a memorandum to the Project Sponsor stating the review has begun. The memorandum should include a schedule for the planned review and indicate any areas that may receive special review emphasis.

2. Analyze Documentation

The review team attains any existing investment documentation and analyzes the information to understand the investment scope, generate interview and survey questions, prepare for system overview briefings, and plan the PIR. The review team also reviews any existing reports and memos from the Pre-Select, Select, and Control Phases to uncover any findings or outstanding issues.

3. Interview Key Players

The review team interviews all key IT and business process players. The interviews should help the team develop an understanding of the system's goals, objectives, benefits, and costs as described in the business case submitted during the Select Phase. Additionally, the interviews will help the team determine how efficient and effective the system's objectives, goals, performance measures, and benefits are being achieved, as well as serve to identify system deficiencies and enhancement needs.

4. Measure Performance

The review team assesses the investment performance measures established during the Select Phase. These performance measures are compared to actual data generated during the operations/production stage. In the absence of certain statistics, the review team may perform onsite observations to measure specific criteria.

5. Perform User Surveys

The review team conducts qualitative surveys with users to determine user satisfaction with the system. Executing the survey includes designing questionnaires, distributing the survey questionnaires to remote users' locations, receiving responses, analyzing results, and generating a survey results memorandum. The survey measures the system's efficiency and effectiveness in achieving its stated goals and benefits and in satisfying user needs.

6. Perform Analysis

The review team analyzes all documentation, survey results, and performance measurements to determine if the system efficiently and effectively achieved its objectives.

7. Issue Report

After comments are received from the Project Sponsor, the review team prepares the Final Report and submits it for the OCIO, EWG, and EITIRB review. The report findings and recommendations must be clear and concise to avoid any misunderstandings.

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

APPENDIX K—STRATEGIC INVESTMENT CRITERIA AND BONUS POINT EVALUATION TOOLS

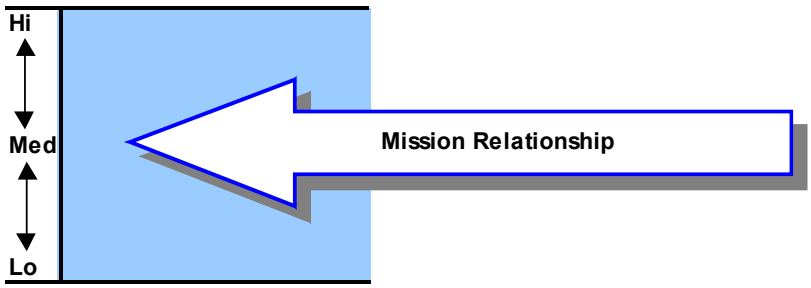
The following pages provide the criteria used by an EWG and the EITIRB during the annual investment review cycle. Each page details the specific materials that are reviewed, evaluation factors, and rating award basis for the project components required. The following chart indicates which factors are rated in the five stages:

Investment Criteria Applicable in Each Phase

Criteria	Pre-Select	Select	Control	Evaluate	Steady-State
Mission	X	X			X
Risk		X			
ROI		X			
Cost			X		X
Schedule			X		
Performance			X		X
Post-Implementation Review				X	
Security		X	X	X	X
Enterprise Architecture		X	X	X	X
Telecommunications		X	X	X	X
Secretarial/Administration Priority	X	X	X		

EVALUATION OF MISSION

Objective: Maximize the relationship between the investment and the mission.



Review the Following Materials Related to Mission and Performance Measures

- Agency Mission Needs Statement
- Statement of Project/System Purpose and Business Case
- Strategic Plan Goals/Strategic Plan Performance Measures and Indicators
- Results of I-TIPS Scoring

Mission Evaluation Factors

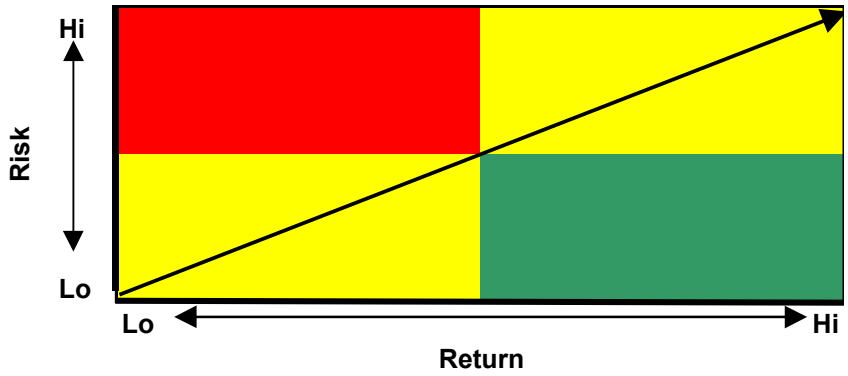
- How does the investment support or influence mission effectiveness?
- Do the performance measures reflect the effectiveness of the investment to achieve mission goals?

Rating Award Basis

5	Award this rating if there is a direct and influential relationship between the investment and the mission, and if the performance measures reflect the ability to directly affect and influence the achievement of mission goals.
4	Award this rating if there is an indirect or support relationship between the investment and the mission, and if the performance measures reflect an indirect ability to positively affect and influence mission goals
3	Award this rating if there is a direct and influential relationship between the investment and the mission, but the performance measures are not well developed enough to determine how the investment would contribute to the achievement of mission goals.
2	Award this rating if there is an indirect or support relationship between the investment and the mission, but the performance measures are not well developed enough to determine how the investment would contribute to the achievement of mission goals.
1	Award this rating if the relationship between the investment and the mission is not clear, or if there are no developed performance measures.

EVALUATION OF RISK

Objective: Maximize Return and Minimize Risk



Some Examples of Different Types of Risk

- Project Costs, Size, or Resource Requirements
- Organization/Project Management
- Strategic/Business Impact
- Security
- Management
- Economic/Financial
- Technical
- Contract/Acquisition
- Implementation
- Change Management
- Human Element

Risk Evaluation Factors

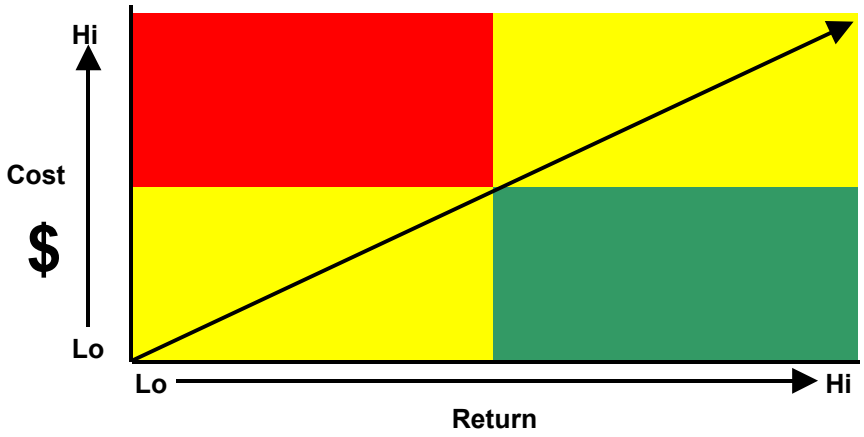
- Is there a comprehensive Risk Management Plan in place?
- Are the appropriate risks identified, quantified, evaluated, and mitigated?

Rating Award Basis

5	Award this rating if there is a comprehensive Risk Management Plan in place, and all the appropriate risks are identified, quantified, evaluated, and mitigated.
4	Award this rating if there is a Risk Management Plan in place, but not all of the risks are identified, and the omissions are minor, and the risk mitigation strategies address the critical areas.
3	Award this rating if there is a Risk Management Plan in place, but not all of the risks are identified, and some of the mitigation strategies are suspect.
2	Award this rating if only token attention has been paid to risk, or if the Risk Management Plan is poorly developed.
1	Award this rating if there is no Risk Management Plan in place.

EVALUATION OF RETURN ON INVESTMENT (ROI)

Objective: Maximize the Return, Minimize the Investment Cost



Examples of Return-On-Investment Measures

- Benefit/Cost Analysis
- Return on Investment Calculations
- Non-quantitative Benefits (Intangibles)
- Discounted Simple Return-On-Investment
- Net Present Value
- Internal Rate of Return
- Discounted Payback Period

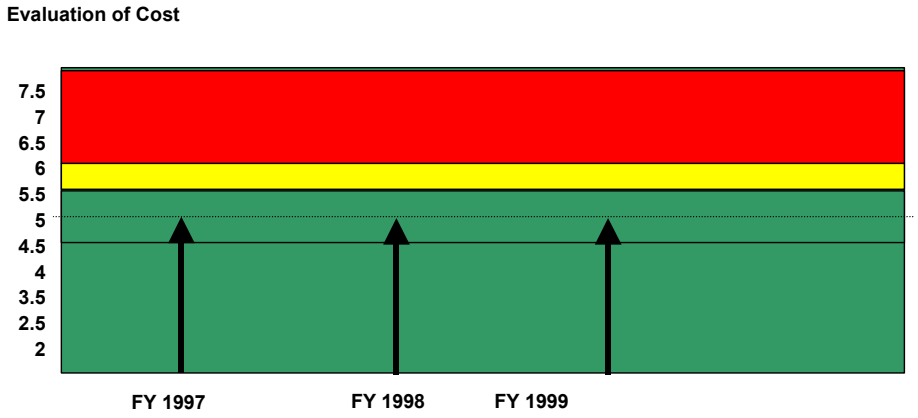
Return on Investment Evaluation Factors

- Has the agency addressed and computed all the quantitative and non-quantitative measures to determine their overall Return-On-Investment?
- Do the measures used indicate that the investment will provide a justifiable Return-On-Investment relative to the investment level?

Rating Award Basis

5	Award this rating if all the ROI measures were addressed and computed, and if they indicate a potential high return on investment.
4	Award this rating if most of the ROI measures were addressed, and if they indicate a potential good return on investment.
3	Award this rating if some ROI measures were used, and if they indicate a potential reasonable return on investment.
2	Award this rating if few or no ROI measures were used, or if they indicate a potential poor return on investment.
1	Award this rating if no ROI measures were prepared.

EVALUATION OF COST



In the example to the left, assume a baseline funding level of $5.0 million for FY 1997, 1998, and 1999. With good cost control discipline, these costs could be controlled within a variance of +/-10% of this level, or between $4.5 million and $5.5 million. A 20% variance would be between $4.0 million and $6.0 million.

Cost Control Considerations

- Cost baseline budget estimates or projections. Revised cost estimates.
- Actual expenditure history and variance.
- Management actions based on actual versus projected cost experience

Cost Evaluation Factors

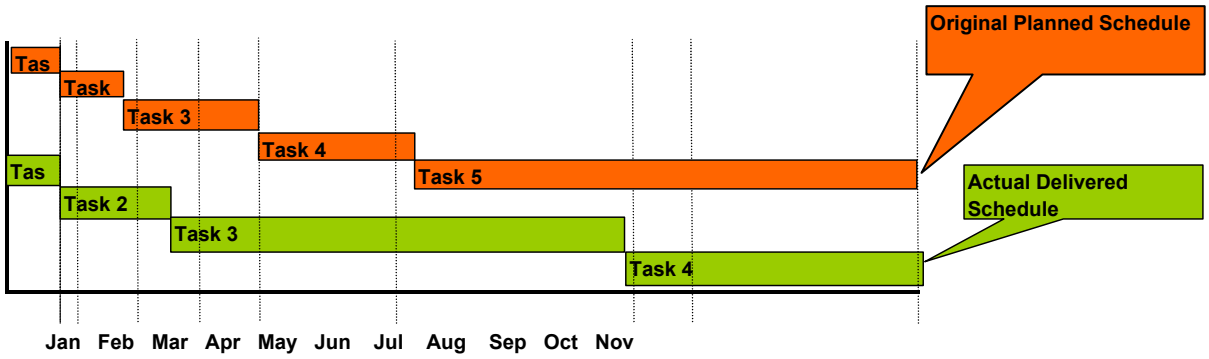
- How well are budgeted and actual costs accounted for, controlled, and managed?
- Are cost variances computed? Are they used to monitor how well the investment is proceeding relative to its cost estimates? Are they used as a management tool?

Rating Award Basis

5	Award this rating if costs are appropriately accounted for, controlled, and managed, and if the original cost estimate has been met.
4	Award this rating if costs are appropriately accounted for, controlled, and managed, and if the cost variance is within 10% cost variance of the original estimates.
3	Award this rating if costs are appropriately accounted for, controlled, and managed, and if the cost variance is within 20% of the original estimates.
2	Award this rating if costs are not appropriately accounted for, controlled, and managed, or if the cost variance is beyond 25% of the original estimate.
1	Award this rating if costs are not appropriately accounted for, controlled, and managed, or if cost variance are not calculated, or if costs are beyond 50% of the original estimates.

EVALUATION OF SCHEDULE

Objective: Deploy and deliver the initiative on time.



Review the Following Materials

- Baseline project plans, timelines, milestone, or Gantt charts
- Actual historical experience relative to the schedule for deployment implementation, and operation
- Strategic and/or tactical plans
- Record of management actions taken

Schedule Evaluation Factors

- How well has the deployment of the initiative adhered to its original project schedule?
- Are schedule slippages being properly managed?

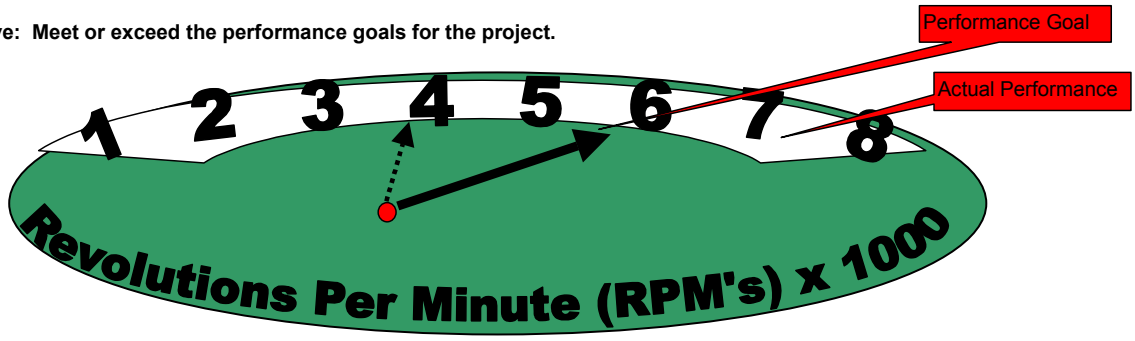
Rating Award Basis

5	Award this rating if the original schedule has been met.
4	Award this rating if the original schedule has been closely adhered to and any schedule slippages are within 10% of original baseline.
3	Award this rating if the project is within 20% of the original schedule and any schedule slippages have been properly managed.
2	Award this rating if the project is delayed more than 20%, but less than 50% of the original schedule, or if schedule slippages have not been properly managed.
1	Award this rating if the project is delayed beyond 50% of the original schedule or if schedule slippages have not been properly managed.

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

EVALUATION OF PERFORMANCE

Objective: Meet or exceed the performance goals for the project.



Performance Considerations

- Original baseline performance design goals
- Performance measures, indicators, or other metrics
- Reports on progress towards meeting original baseline design goals or performance measures or indicators

Performance Evaluation Factors

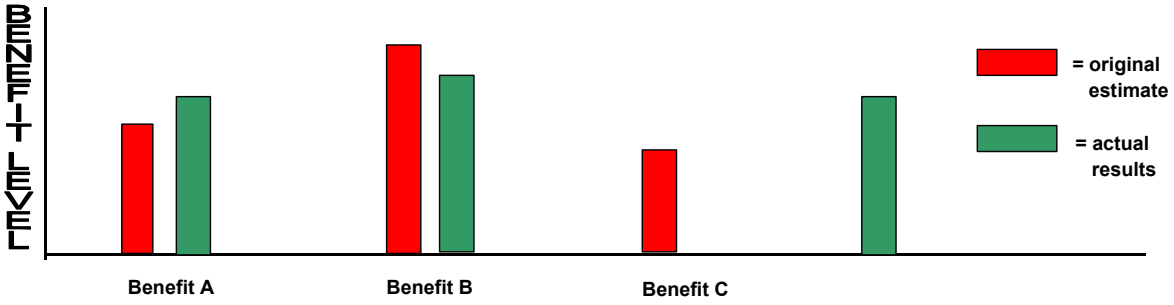
- How well has the agency done in identifying original baseline goals?
- How well has the agency done in identifying performance measures and indicators?
- How well has the agency done in reporting progress in attaining their baseline goals or attaining their targets for performance measures and indicators?
- How meaningful are the identified baseline performance goals and the performance measures and indicators in measuring the "value" of the investment to the supported program?

Rating Award Basis

5	Award this rating if the agency has done a commendable job at identifying both original baseline performance goals and performance measures and indicators, and that the reports indicate full attainment of the original performance goals and their related performance measures and indicators.
4	Award this rating if the agency has done a commendable job at identifying both baseline performance goals and performance measures and indicators, and that they report achieving within 10% of the original design goals/measures/indicators.
3	Award this rating if the agency has done a fair job at identifying baseline performance goals and performance measures and indicators, and that they report achieving within 20% of the original design goals/measures/indicators.
2	Award this rating if the agency has done a fair job at identifying baseline performance goals, but the performance measures and indicators are lacking in specificity, and progress towards these goals/measures/indicators are not well tracked.
1	Award this rating if the agency has done a poor job at identifying either baseline performance goals or performance measures and indicators, or if unsatisfactory progress has been made towards achieving those goals and measures, or if they are not appropriately tracked.

EVALUATION OF POST-IMPLEMENTATION REVIEWS

Objective: **How well has the project delivered the original baseline benefits or expectations.**



A Post-Implementation Review (PIR) is a comprehensive look at how well the project has performed after it is in full operation. The areas of study should include cost, schedule, and performance, as well as user satisfaction and contribution to the mission. The PIR should be used by management to determine the future direction of the project, as well as to apply lessons learned back to the Select and Control phases of Capital Planning.

Post-Implementation Review Considerations

- Post-Implementation-Review documents
- Management actions based on post-implementation review activities

Post-Implementation Review Evaluation Factors

- How well has the agency done at conducting post-implementation reviews and of documenting the progress towards achieving the original goals, benefits, and expectations?
- How well has management done at using the results of those reviews as the basis for taking the appropriate management action on the investment and the investment process?

Rating Award Basis

5	Award this rating if the agency has done a commendable job at conducting post-implementation reviews, and if those reviews report attainment of the goals, benefits, and expectations that were originally envisioned for the project, and if those reviews have been used by management to assess the project and the process, and taken appropriate actions.
4	Award this rating if the agency has done a commendable job at conducting post-implementation reviews, and if the review report attainment of the majority of the goals, benefits, and expectations that were originally envisioned for the project and if those reviews have been used by management to assess the project and take appropriate actions on the investment and the investment process.
3	Award this rating if the agency has done a fair job at conducting post-implementation reviews, and if the reviews results were used to determine appropriate changes to the investment.
2	Award this rating if the agency has made some effort to conduct post-implementation reviews, but the results do not clearly indicate progress toward attainment of goals, benefits, and expectations, or they were not used to manage the investment.
1	Award this rating if the agency has not conducted post-implementation reviews.

EVALUATION OF SECURITY

Objective: To protect the availability, confidentiality and integrity of system assets by maximizing security safeguards and performance, while controlling security costs.

Elements of Security Protection

Select Phase:
- Security Analysis
- Risk assessment/Mitigation

Control Phase:
- Security Cost
- Performance Goals

Evaluation and Steady-State Phases:
- Security Post Implementation Reviews

Security Evaluation Factors

Select Phase:
- Has a comprehensive security analysis been conducted?
- Are security risks identified and mitigation strategies proposed?

Control Phase:
- Have estimated security costs been compared to actual costs?
- Are the estimated and actual costs inline?
- Have security goals and measures been established and met?

Evaluation and Steady-State Phases:
- Is the system security functioning as anticipated?
- Are additional security countermeasures needed to protect assets?

Rating Award Basis

Select Phase

5	Comprehensive security analysis done, appropriate risks identified, mitigation strategies sound, security cost accurate, security complements departmental architecture.
4	Comprehensive security analysis done, appropriate risks identified, mitigation strategies sound, security cost accurate, security complements departmental architecture.
3	Comprehensive security analysis done with minor omissions, most but not all risks identified, some mitigation strategies suspect, security costs accurate, security complements departmental architecture.
2	Security analysis has been done with major omissions, risk assessment/mitigation strategies inadequate, cost data is incomplete, security does not complement departmental architecture.
1	Security analysis has not been done, risks and mitigation strategies are not identified, cost data not accurate, security does not complement departmental architecture.

Rating Award Basis

Control Phase

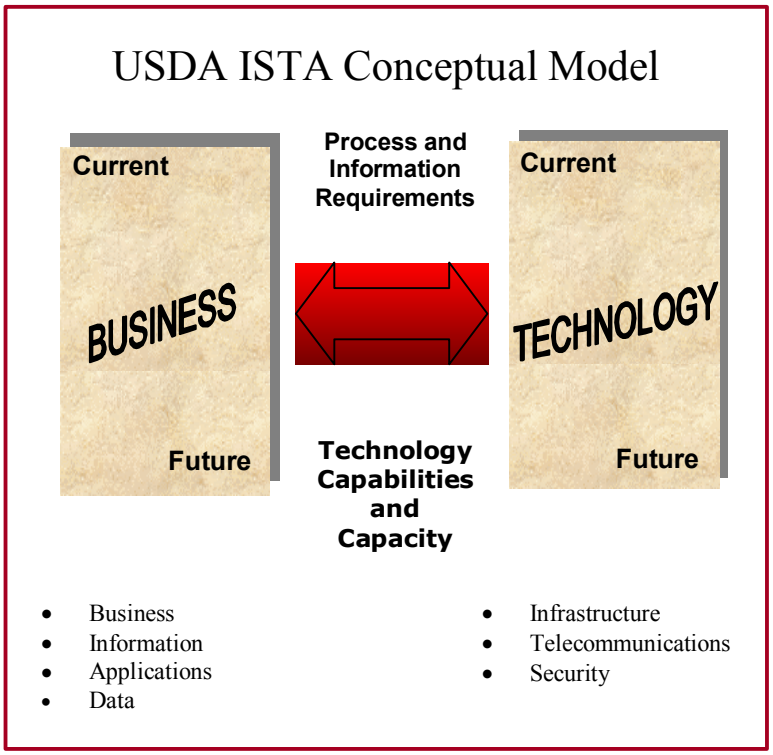
5	Security costs are appropriately accounted for, controlled, managed, original cost estimate is accurate, detailed performance goals/measures established.
4	Security costs are appropriately accounted for, controlled, managed, cost variance is within 10% of original estimates, detailed performance goals/measures established.
3	Security costs are appropriately accounted for, controlled, managed, cost variance is within 20% of original estimates, reasonable performance goals/measures established.
2	Security costs are not appropriately accounted for, controlled, or managed and cost variance is beyond 25% of original estimates, reasonable performance goals/measures have been established.
1	Security costs are not appropriately accounted for, controlled, managed, and cost variance is beyond 50% of original estimates, reasonable performance goals/measures have not been established.

Rating Award Basis

Evaluation and Steady-State Phases

5	Agency has done a commendable job in conducting post-implementation security reviews; results confirm attainment of the goals, benefits and expectations for the project.
4	Agency has done a commendable job in conducting post-implementation security reviews; results were used to determine appropriate changes to investment process and to take remedial actions on project.
3	Agency has done an average job in conducting post-implementation security reviews; results used to assess the desired goals/benefits/expectations of project, changes made in investment process, remedial actions taken on project.
2	Agency has made some effort to conduct post-implementation security reviews; results have not had sufficient impact on the project or investment process.
1	Agency has not performed any post implementation security reviews, or results were not documented and have not had sufficient impact on the project or investment process.

EVALUATION OF ENTERPRISE ARCHITECTURE



Enterprise Architecture: Elements of Business/Technology Infrastructure Alignment

- The investment adheres to the EA principles and standards; and the EA future direction.
- Opportunities for data, information, and technology infrastructure sharing to reduce duplication, and the steps needed to accommodate these opportunities are identified.
- Hardware and software acquisitions make use of commercial-off-the-shelf (COTS) products.
- Robust management processes are identified to support, maintain, and refresh the investment; and to train users and systems support staff.

Evaluation Factors for Enterprise Architecture (EA)

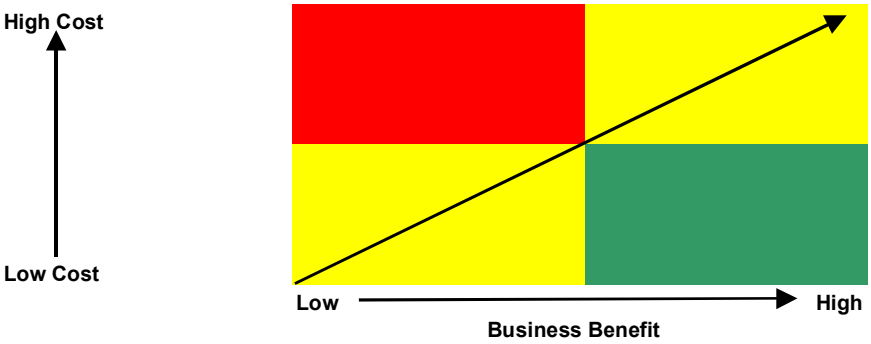
- Does this investment conform to the EA goals and objectives (interoperability, resource sharing, potential for reduced costs, sharing processes and information, and timely and comprehensive support for managers); and comply with the current EA principles and standards?
- Is a credible migration plan (for data, applications, and legacy system phase-out) from the existing to the proposed environment presented?
- Are detailed management plans in place describing how this investment will be supported, maintained, and refreshed to ensure its currency and continued effectiveness, including a training and awareness plan for users and technical staff?
- Is an asset management process(es) in place to inventory and manage this new asset (investment) from a property management perspective, to provide configuration management support, and to monitor system performance?

Rating Award Basis

5	Award this score if all of the EA goals, objectives, principles, and standards have been met; and if all required plans and processes are in place or substantially near completion and scheduled for implementation.
4	Award this score if the EA goals, objectives, principles, and standards have been largely met; and any exception to the EA goals, objectives, principles, and standards is clearly identified and documented with a strong business needs driven justification and an assessment of impact on the EA attributable to the exception. Further, the required plans and processes are in place or near completion and scheduled for implementation.
3	Award this score if the EA goals, objectives, principles, and standards have been reasonably met; and exceptions to the EA goals, objectives, principles, and standards are clearly identified and documented with a good business needs driven justification and an reasonable assessment of impact on the EA attributable to the exceptions. Further, the required plans and processes are under development and near completion and scheduled for implementation.
2	Award this score if the EA goals, objectives, principles, and standards have been only met in part; and that exceptions to the EA goals, objectives, principles, and standards are not clearly identified nor documented with a good business needs driven justification nor a good assessment of impact on the EA attributable to the exceptions. Further, the required plans and processes are incomplete and with no definitive schedule for implementation.
1	Award this score if the EA goals, objectives, principles, and standards have been ignored or only met in a limited way; and that exceptions to the EA goals, objectives, principles, and standards are only vaguely identified or not addressed, nor documented with any business needs driven justification nor any assessment of impact on the EA attributable to the exceptions. Further, the required plans and processes are incomplete or non-existent, and with no schedule for implementation.

EVALUATION OF TELECOMMUNICATIONS

Objective: To promote the economic and efficient acquisition of USDA telecommunications systems and services by eliminating past practices that have led to stove piped duplicative networks and high costs.



Elements of Telecommunications Infrastructure Analysis

Select Phase:
- Telecommunications Infrastructure Analysis
- Cost Estimate
- Agency Telecommunications Plan

Control Phase:
- Review Cost Estimate
- System/Service Performance Goals/Measures

Evaluation and Steady-State Phases:
- Post Implementation Reviews of Telecommunications Infrastructure

Telecommunications Evaluation Factors

Select Phase:
- Has a comprehensive telecommunications analysis been conducted?
- Resource sharing explored? Has a supportable cost estimate and agency telecommunications plan been prepared for the system/service?

Control Phase:
- Have estimated original cost estimates been compared to actual costs?
- Have goals and measures been established for this system/service?

Evaluation and Steady-State Phases:
- Is the system telecommunications infrastructure functioning as anticipated?
- What are the lessons learned for replacement/upgrade systems?

Rating Award Basis

Select Phase

5	Comprehensive telecommunications analysis done, cost estimates reasonable, resource sharing explored, and Agency Telecommunication Plan prepared.
4	Comprehensive telecommunications analysis done, supported cost estimate provided, resource sharing explored, and an Agency Telecommunications Plan prepared.
3	Comprehensive telecommunications analysis done with minor omissions, cost estimate provided, resource sharing explored, and an Agency Telecommunications Plan prepared.
2	Comprehensive telecommunications analysis done with major omissions, cost estimate incomplete, resource sharing not explored, and an Agency Telecommunications Plan prepared.
1	Comprehensive telecommunications analysis not done, cost estimate not included, resource sharing not explored, and an Agency Telecommunications Plan not prepared.

Rating Award Basis

Control Phase

5	Telecommunications costs are appropriately accounted for, controlled, and managed; original cost estimate is accurate, system/service performance goals/measures established.
4	Telecommunications costs are appropriately accounted for, controlled, and managed; original cost variance is within 10% of original estimate, and system/service performance goals/measures established.
3	Telecommunications costs are appropriately accounted for, controlled, and managed; cost variance is within 20% of original estimates, system/service performance goals/measures established.
2	Telecommunications costs are not appropriately accounted for, controlled, and managed; cost variance is within 25% of original estimates, system/service performance goals/measures established.
1	Telecommunications costs are not appropriately accounted for, controlled, and managed; cost variance is within 25% of original estimates, system/service performance goals/measures not established.

Rating Award Basis

Evaluation and Steady-State Phases

5	Agency has done a commendable job in conducting post-implementation reviews of the telecommunications infrastructure; results confirm attainment of the goals/measures for the project.
4	Agency has done a commendable job in conducting post-implementation reviews of the telecommunications infrastructure; results were used to determine appropriate changes to the investment process and take remedial actions on this project.
3	Agency has done an average job in conducting post-implementation reviews of the telecommunications infrastructure with minor omissions; results used to assess desired benefits for this project, changes made in the investment process, remedial actions taken to maximize benefits.
2	Agency has made some effort to conduct post-implementation reviews of the telecommunications infrastructure with major omissions; results have not had sufficient impact on the project or investment process.
1	Agency has not performed any post implementation reviews of the telecommunications infrastructure, or results were not documented and have not had sufficient impact on the project or investment process.

EVALUATION OF SECRETARIAL/ADMINISTRATION PRIORITIES

Objective: Give extra consideration to those project that directly support the announced priority initiatives of the Secretary or the Administration.

Secretarial/Administration Priority Considerations

- Policy statements by the Secretary and Under and Assistant Secretaries
- Department/Administration budget priorities

Rating Award Basis

★	Award this bonus point if the investment supports a Secretarial or Administration priority, or is an acknowledged budget priority.
	Make no award if the investment does not support a Secretarial or Administration priority, or is not an acknowledged budget priority.

APPENDIX L—I-TIPS REQUIREMENTS BY PHASE

The following is a checklist for I-TIPS Investment and Portfolio Managers to use when entering information in I-TIPS on their agency's investments. This list is divided into the five phases of the CPIC process. For further instructions on using I-TIPS, please refer to the *I-TIPS Users' Guide, Version 3.02* by selecting the following URL: Version 3.02 User Guide.

L.1 PRE-SELECT PHASE

- ❑ Create the new investment.
- ❑ Create a *Contacts* list for this investment.
- ❑ Add the investment to your agency's *Investment Pool* and to the agency's *Investment Portfolio*.
- ❑ Designate the investment as *Major, Significant,* or *Small/Other.*
- ❑ Ensure that points of contact such as the Functional Manager and Project Sponsor are kept updated within the *General Information* folder.
- ❑ Complete the *Select Screening Criteria* checklist found in the *Selection Screening Information* of the *Selection Information* Section.
- ❑ As directed by your agency, use the established scoring weights and rules in I-TIPS to assist in ranking this investment with others in the portfolio.
- ❑ Complete *Lifecycle Cost* and *Lifecycle Budget Information* located in the *Financial Information* folder.
- ❑ Add supporting information to the *Resource Library* for the investment, such as preliminary budget estimates and spreadsheets and the Investment Review submission package.
- ❑ Grant *Permissions* to allow OCIO, OCFO, EWG, EITIRB, and others to view the investment.

L.2 SELECT PHASE

- ❑ Update the Lifecycle Cost and Lifecycle Budget Information located in the Financial Information folder as required.
- ❑ Add any new or revised documentation that supports the initiative to the Resource Library. This includes documentation such as the Investment Review submission package, the Performance Measures Plan, Project Plan with schedule and costs, and Security and Telecommunications information. It also includes the Business Case, Risk Profile, Technical Profile, and Management and Planning Profile information.
- ❑ Complete the Performance Measures information.
- ❑ Complete the Planned Cost and Schedule Information.
- ❑ Review and complete the Select Screening Criteria checklist found in the Selection Screening Information of the Selection Information Section.
- ❑ Complete the Select Scoring Scorecard Information located in the Selection Scoring Information section of the Investment Manager.
- ❑ Grant *Permissions* as needed to enable editing, viewing, and scoring.

L.3 CONTROL PHASE

- ❑ Update the Lifecycle Cost and Lifecycle Budget Information located in the Financial Information folder as required.
- ❑ Add any new or revised documentation that supports the initiative to the Resource Library, such as the Investment Review submission package.
- ❑ Update the Performance Measures information.
- ❑ Update the Planned Cost and Schedule Information.
- ❑ Complete the Control Screening Criteria checklist found in the Control Screening Information section.
- ❑ Complete the Control Scoring Scorecard Information located in the Control Scoring Information of the Investment Manager.
- ❑ Review initiative history and background information to support assignment of individual scores located in the General Information folder and in the initiative's Resource Library.
- ❑ Ensure all folders from the Select Phase are completed and the Selection Status folder indicates the investment is approved and finalized so it can advance to the Control Phase.

- ❑ Complete the Control Screening and Control Scoring data screens in the Control Information folder.
- ❑ Complete the Control Cost and Schedule Information folder including milestones to the 2nd level, associated costs, and variances.
- ❑ Grant *Permissions* as needed to enable editing, viewing, and scoring.

L.4 EVALUATE PHASE

- ❑ Update the Performance Measures information.
- ❑ Update the Planned Cost and Schedule Information.
- ❑ Add any new or revised documentation that supports the initiative to the Resource Library, such as the Investment Review submission package. Include copies of the Post-Implementation Review and Independent Verification and Validation.
- ❑ Grant *Permissions* as needed to enable editing, viewing, and scoring.

L.5 STEADY-STATE PHASE

- ❑ Update the *Performance Measures* information.
- ❑ Update the *Planned Cost and Schedule Information.*
- ❑ Add any new or revised documentation that supports the initiative to the *Resource Library*, such as the Investment Review submission package.
- ❑ Add any new or revised documentation that supports the initiative to the *Resource Library*, such as the Investment Review submission package. Include copies of the *Post-Implementation Review* and *Independent Verification and Validation.*
- ❑ Grant *Permissions* as needed to enable editing, viewing, and scoring.

APPENDIX M—QUARTERLY/MILESTONE CONTROL REVIEW CHECKLIST

During CPIC Control Reviews, the following are critical areas that should be addressed. The Control Review Team will discuss these areas and a report shall be given to the Team.

1. Status of the critical path:
   a. Where is the investment on the critical path?
   b. If it is behind schedule, by how much?
   c. Is there a strong plan for recovery and what steps are being taken to recover?
2. Milestone hit rate:
   a. What is the total number of milestones planned vs. the total number actually met?
   b. What is the milestone hit rate since the last control review or since the most recent EITIRB review?
3. Deliverables hit rate:
   a. What is the number of deliverables provided to date vs. the number planned?
4. Issues:
   a. Have their been issues that had a major effect on the investment?
   b. Are issues logged and evaluated, and resolutions documented?
5. Actual cost-to-date vs. estimated cost-to-date:
   a. What is the total cost-to-date vs. the estimated cost-do-date?
   b. Is Earned Value Management used to measure actual resources expended against planned resources expended and to estimate future performance of projects?
   c. Are causes of cost variances tracked and addressed?
6. Actual Resources vs. planned resources:
   a. Are there more or fewer FTEs working vs. number of FTEs planned?
   b. Has there been significant unplanned core team, Project Manager or Sponsor turnover?
7. Have high probability and high impact risks been tracked and adequately addressed?
8. Has contractor reporting been adequate?
   a. Does the contractor report by WBS?
      i. Task progress
      ii. Deliverables
      iii. Planned activities
      iv. Expenditures
   b. Are the reports assessed and action taken?

APPENDIX N—GLOSSARY OF TERMS AND ACRONYMS

N.1 GLOSSARY OF TERMS

Acquisition Plan	Description of the acquisition approach including: ❖ Contract strategy (definition of government and contractor roles and responsibilities) ❖ Use of COTS software ❖ Major milestones (such as software releases, hardware delivery and installation, and testing).
Actual Cost of Work Performed	The costs actually incurred and recorded in accomplishing the work performed within a given time period.
Architectural Alignment	Degree to which the IT initiative is compliant with USDA's information technology architecture.
Architecture	An integrated framework for evolving or maintaining existing technologies and acquiring new technologies to support mission(s).
Benefit	Quantifiable or non-quantifiable advantage, profit, or gain.
Benefit-Cost Ratio	The Total Discounted Benefits of an investment divided by the Total Discounted Costs of the investment. If the value of the Benefit-Cost Ratio is less than one, the investment should not be continued.
Budget at Completion	The sum of all budgets established for the contract.
Budgeted Cost for Work Performed	The sum of the budgets for completed work packages and completed portions of open work packages, plus the applicable portion of the budgets for level of effort and apportioned effort.
Budgeted Cost of Work Scheduled	The sum of all WBS element budgets that are planned or scheduled for completion.
Business Case	Structured proposal for business improvement that functions as a decision package for organizational decision-makers. A business case includes an analysis of business process performance and associated needs or problems, proposed alternative solutions, assumptions, constraints, and risk-adjusted CBA.
Business Process	A collection of related, structured activities or chain of events that produce a specific service or product for a particular customer or group of customers.
Business Process Re-engineering	A systematic, disciplined approach to improving business processes that critically examines, rethinks, and redesigns mission delivery processes.
Capital Asset	Tangible property, including durable goods, equipment, buildings, installations, and land.
Contract Budget Base	The total cost of all budgeted activities necessary to complete a task.
Control Phase	Capital planning phase that requires ongoing monitoring of information technology investments against schedules, budgets, and performance measures.
Cost-Benefit Analysis	An evaluation of the costs and benefits of alternative approaches to a proposed activity to determine the best alternative.
Cost Performance Index	Earned Value divided by the actual cost incurred for an investment.
Cost Variance	Earned Value minus the actual cost incurred for an investment.
Customer	Groups or individuals who have a business relationship with the organization; those who receive or use or are directly affected by the products and services of the organization.

Data Documentation	Compilation of materials including data dictionary, decomposition diagrams, and data models.
Description of Initiative	Brief overview of initiative of no more than 100 words to include: ❖ Short summary of proposed initiative ❖ Statement of the business functions or processes the initiative supports ❖ Brief summary of benefits resulting from the initiative (tangible or intangible).
Design Documentation	Document that includes system design diagrams.
Discount Factor	The factor that translates expected benefits or costs in any given future year into present value terms. The discount factor is equal to $1/(1 + i)t$ where i is the interest rate and t is the number of years from the initiation date for the program or policy until the given future year.
Discount Rate	The interest rate used in calculating the present value of expected yearly benefits and costs.
Earned Value Analysis	A structured approach to project management and forecasting including comparisons of actual and planned costs, work performed, and schedule.
Estimate at Completion	The actual costs incurred, plus the estimated costs for completing the remaining work.
Estimate to Complete	The cost necessary to complete all tasks from the actual cost of work performed end date through the investment's conclusion.
Evaluate Phase	Capital planning phase that requires information technology investments to be reviewed once they are operational to determine whether the investments meets expectations.
Expected Outcome	Projected end result of the initiative (e.g., system(s) being replaced or improved customer service) that is directly linked with performance measures.
Feasibility Study	Preliminary research performed to determine the viability of the proposed initiative by performing an alternatives analysis including market research and extensive interviews with subject matter experts. Also includes a proposed technical approach and preliminary cost, scope, and schedule data.
Financial System	An information system used for any of the following: ❖ Collecting, processing, maintaining, transmitting, or reporting data about financial events; ❖ Supporting financial planning or budgeting activities; ❖ Accumulating and reporting cost information; or ❖ Supporting the preparation of financial statements.
Functional Requirements	A description of system capabilities or functions required to execute a required process such as a communication link between several locations and generating specific reports.
Hardware/Equipment	Includes any equipment used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information (e.g., computers and modems); capital and non-capital purchases or leases.
Independent Verification and Validation	An independent review conducted by persons separate from the management and operation of the investment or system.
Inflation	The proportionate rate of change in the general price level, as opposed to the proportionate increase in a specific price. Inflation is usually measured by a broad-based price index, such as the implicit deflator for Gross Domestic Product or the Consumer Price Index.
Information System	A discrete set of information resources organized for the collection, processing, maintenance, transmission, and dissemination of information in accordance with defined procedures, whether automated or manual.

Information System Lifecycle	The duration of the system life typically organized into four phases: initiation, development, operation, and disposal.
Information Technology	Any equipment or interconnected system or subsystems or equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information.
Infrastructure	The IT operating environment (e.g., hardware, software, and communications).
Lifecycle Benefits	The overall estimated benefits for a particular program alternative over the time period corresponding to the life of the program including: ❖ Cost/expense reduction (productivity and headcount), ❖ Other expense reductions (operational), ❖ Cost/expense avoidance, and ❖ Revenue-related savings.
Lifecycle Cost	The overall estimated cost for a particular program alternative over the time period corresponding to the life of the program including direct and indirect initial costs plus any periodic or continuing costs of operation and maintenance.
Management Reserve	The amount of the total allocated budget withheld for management control purposes rather than designated for the accomplishment of a specific task or set of tasks; not part of the performance measurement.
Net Present Value	The difference between the discounted present value of benefits and the discounted present value of costs. This is also referred to as the discounted net.
Opportunity Costs	Cost of not investing in the initiative or cost of a forgone option.
Payback Period	The number of years it takes for the cumulative dollar value of the benefits to exceed the cumulative costs of an investment.
Performance Indicator	Description of: ❖ What is to be measured, including the metric to be used (e.g., conformance, efficiency, effectiveness, costs, reaction, or customer satisfaction) ❖ Scale (e.g., dollars, hours, etc.) ❖ Formula to be applied (e.g., percent of “a” compared to “b,” mean time between failures, annual costs of maintenance, etc.) ❖ Conditions under which the measurement will be taken (e.g., taken after system is operational for more than 12 hours, adjusted for constant dollars, etc.)
Performance Measurement Baseline	The time-phased budget plan against which investment performance is measured.
Performance Measures	Method used to determine the success of an initiative by assessing the investment contribution to predetermined strategic goals. Measures are quantitative (e.g., staff-hours saved, dollar saved, reduction in errors, etc.) or qualitative (e.g., quality of life, customer satisfaction, etc.)
Post-Implementation Review	Evaluation of the information technology investment after it has been fully implemented or terminated to determine whether the targeted outcome (e.g., performance measures) of the investment has been achieved.
Pre-Select Phase	Capital planning phase that provides a process to assess whether information technology investments support strategic and mission needs.
Project Plan	A document that describes the technical and management approach to carrying out a defined scope of work including the project organization, resources, methods, and procedures and the project schedule.

Return	The difference between the value of the benefits and the costs of an investment. In a Cost-Benefit Analysis it is computed by subtracting the Total Discounted Costs from the Total Discounted Benefits, and is called the Total Discounted Net.
Return on Investment	Calculated by dividing the Total Discounted Net by the Total Discounted Costs. To express it as a percentage, multiply by 100. It can also be expressed as (Total Discounted Benefits minus Total Discounted Costs) divided by Total Discounted Costs.
Risk	A combination of the probability that a threat will occur, the probability that a threat occurrence will result in an adverse impact, and the severity of the resulting impact.
Risk Assessment and Management Plan	A description of potential cost, schedule, and performance risks, and impact of the proposed system to the infrastructure. Includes a sensitivity analysis to articulate the effect different outcomes might have on diminishing or exacerbating risk. Provides an approach to managing all potential risks.
Risk Management	The process concerned with identifying, measuring, controlling, and minimizing risk.
Schedule Variance	Earned Value minus the planned budget for the completed work.
Security	Measures and controls that ensure the confidentiality, integrity, availability, and accountability of the information processes stored by a computer.
Security Plan	Description of system security considerations such as access, physical or architectural modifications, and adherence to Federal and USDA security requirements.
Select Phase	Capital planning phase used to identify all new, ongoing, and operational investments for inclusion into the information technology portfolio.
Sensitivity Analysis	An analysis of how sensitive outcomes are to changes in assumptions. Assumptions about the dominant cost or benefits elements and the areas of greatest uncertainty deserve the most attention.
Software	Any software, including firmware, specifically designed to make use of and extend the capabilities of hardware/equipment.
Steady-State Phase	Capital planning phase that provides the means to assess mature information technology investments to ensure they continue to support mission, cost, and technology requirements.
Sunk Cost	A cost incurred in the past that will not be affected by any present or future decisions. Sunk costs should be ignored in determining whether a new investment is worthwhile.
Technical Requirements	Description of hardware, software, and communications requirements associated with the initiative.
Variance at Completion	The difference between the total budget assigned to a contract, WBS element, organizational entity, or cost account and the estimate at completion; represents the amount of expected overrun or underrun.

N.2 ACRONYMS

AB	Annual Benefit
AC	Annual Cost
ACWP	Actual Cost of Work Performed
AS	Agency Sponsor
BAC	Budget at Completion
BCR	Benefit-Cost Ratio

BCWP	Budgeted Cost for Work Performed
BCWS	Budgeted Cost of Work Scheduled
BPR	Business Process Reengineering
CBA	Cost-Benefit Analysis
CBB	Contract Budget Base
CCA	Clinger-Cohen Act
CFO	Chief Financial Officer
CIO	Chief Information Officer
COTS	Commercial-off-the-shelf
CPI	Cost Performance Index
CPIC	Capital Planning and Investment Control
CSBR	Cost, Schedule, Benefit, and Risk
CV	Cost Variance
DB	Discount Benefit
DC	Discount Cost
DF	Discount Factor
EAC	Estimate at Completion
EBT	Electronic Benefit Transfer
EITIRB	Executive Information Technology Investment Review Board
ETC	Estimate to Complete
EWG	Executive Working Group(s)
FAA	Federal Aviation Administration
FASA	Federal Acquisition Streamlining Act
FM	Functional Manager
FTEs	Full-Time Equivalents
FY	Fiscal Year
GAO	General Accounting Office
GPRA	Government Performance and Results Act
GSA	General Services Administration
GWACS	Government-wide Agency Contracts
IOC	Initial Operational Capability
IPT	Integrated Project Team
IRM	Information Resource Management
ISTA	Information System Technology Architecture
IT	Information Technology
I-TIPS	Information Technology Investment Portfolio System

IV&V	Independent Verification and Validation
MB	Megabyte
MNS	Mission Needs Statement
MR	Management Reserve
NPV	Net Present Value
O&M	Operations and Maintenance
OBPA	Office of Budget and Program Analysis
OCFO	Office of the Chief Financial Officer
OCIO	Office of the Chief Information Officer
OMB	Office of Management and Budget
OPPM	Office of Procurement and Property Management
PIR	Post-Implementation Review
PMB	Performance Measurement Baseline
PRA	Paperwork Reduction Act
RFP	Request for Proposals
ROI	Return on Investment
SV	Schedule Variance
USDA	United States Department of Agriculture
VAC	Variance at Completion
WBS	Work Breakdown Structure

APPENDIX O—REFERENCES

Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-Making, U.S. General Accounting Office, Accounting and Information Management Division, February 1997.

Capital Programming Guide, Office of Management and Budget, July 1997.

Circular A-11: Preparing and Submitting Budget Estimates, Office of Management and Budget, July 2000.

Circular A-76: Performance of Commercial Activities, Office of Management and Budget, June 1999.

Circular A-94: Discount Rates to be Used in Evaluating Time-Distributed Costs and Benefits, Office of Management and Budget, 1992.

Circular A-127: Financial Management Systems, Office of Management and Budget, 1993.

Circular A-130: Management of Federal Information Resources, Office of Management and Budget, February 8, 1996.

Clinger/Cohen Act of 1996 (formerly the Information Technology Management Reform Act [ITMRA]).

Cost-Benefit Analysis Evaluation Guide, National Institutes of Health, Center for Information Technology, Office of the Deputy Chief Information Officer, August 2000.

Department of Defense Handbook: Work Breakdown Structure, U.S. Department of Defense, MIL-HDBK-881, www.acq.osd.mil/pm/newpolicy/wbs/wbs.html, January 2, 1998.

Earned Value Management Implementation Guide, U.S. Department of Defense, www.acq.osd.mil/pm/currentpolicy/jig/evmig1.htm, October 3, 1997.

Earned Value Management Systems (EVMS) Basic Concepts, Project Management Institute, www.acq.osd.mil/pm/paperpres/sean_alex/s1d009.htm.

Evaluating Information Technology Investments, Office of Management and Budget, February 1995.

Executive Guide: Leading Practices in Capital Decision-Making, U.S. General Accounting Office, Accounting and Information Management Division, December 1998.

Fleming, Quentin W., *Earned Value Project Management: A Powerful Tool for Software Projects*, Primavera Systems, Inc., www.stsc.hill.af.mil/crosstalk/1998/jul/value.htm, July 1998.

Guide to Implementing IT Capital Planning and Investment Control, U.S. Department of Agriculture, Office of the Chief Information Officer, April 19, 1998.

Guide to IT Capital Planning and Investment, U.S. Department of Energy, September 1999.

Implementing Best Practices: Strategies at Work (Draft), Report of the Capital Planning and IT Investment Committee of the Federal CIO Council, August 1997.

Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity (Exposure Draft), U.S. General Accounting Office, Accounting and Information Management Division, May 2000.

Information Technology Investment Management: An Overview of GAO's Assessment Framework (Exposure Draft), U.S. General Accounting Office, Accounting and Information Management Division, May 2000.

Introduction to NIH IT Performance Measures, National Institutes of Health, Center for Information Technology, Office of the Deputy Chief Information Officer, May 9, 2000.

Investigative Report of Senator Fred Thompson on Federal Agency Compliance with the Clinger-Cohen Act, U.S. Senate, Committee on Governmental Affairs, October 20, 2000.

Investment Management Guide (Revised Copy), U.S. Department of Justice, January 1999.

Investment Management Process System Description, Version 2.1, U.S. Customs Service, May 15, 2000.

IT Capital Planning and Investment Guide, U.S. General Services Administration, Office of the Chief Information Officer, October 1997.

Lagas, Robert, *Cost-Benefit Analysis Guide for NIH Projects*, National Institutes of Health, Center for Information Technology, Office of the Deputy Chief Information Officer, May 1999.

Hall, Elaine M., *Managing Risk: Methods for Software Systems Development,* Addison-Wesley, Reading, MA, January 1998.

Performance-Based Management: Eight Steps to Develop and Use Information Technology Performance Measures Effectively, U.S. General Services Administration, Office of Governmentwide Policy, December 1996.

Recommended Criteria for IT Investment Decision-Making Under Implementation of ITMRA '96, U.S. Department of Defense Office of the Assistance Secretary of Defense for Command, Control, Communications, and Intelligence (ASD, C3I), August 1997.

Smart Practices in Capital Planning, The Federal CIO Council, Capital Planning and IT Management Committee, Industry Advisory Council (IAC), October 2000.

VA Information Technology Capital Investment Guide, U.S. Department of Veteran Affairs, June 15, 2000.

Wilkens, Tammo T., *Earned Value, Clean and Simple*, Los Angeles County Metropolitan Transportation Authority, www.acq.osd.mil/pm/paperpres/wilkins_art.pdf.